CURRICULUM DEVELOPMENT IN HORTICULTURE

WITHIN

THE SOUTH AFRICAN QUALIFICATIONS

AUTHORITY FRAMEWORK

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DECLARATION

I, the undersigned, hereby declare that the work contained in this dissertation is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

ABSTRACT

The curricula of the Technikon National Diplomas in Horticulture, Landscape Technology and Parks (Open Space) and Recreation Management have been intermittently revised since the original inception in 1972 of the ND in Horticulture. The shortcomings in the process of curriculum revision, with special reference to programmes in Horticulture, were identified. The institution of outcomes-based education (OBE) and the National Qualifications Framework (NQF) followed the promulgation of the South African Qualifications Authority Act (No. 58 of 1995). All curricula are currently being written in terms of learning outcomes that qualifying learners will be expected to demonstrate.

The primary aim of this research study has been based upon the proposition that a scientifically validated situational analysis is an essential precursor to the design or redesign of a curriculum for tertiary-level horticultural training. A situational analysis that includes the sectors of Amenity horticulture, Arboriculture, Floriculture, Landscape, Nursery production, Nursery retail and Turf was undertaken. The results of this analysis were to be utilised in the development of a theoretical curriculum framework, which may be used in the development of a revised curriculum.

The secondary aims of the study are complementary to the primary aim as the situational analysis has led directly to the identification of the core and specific skills/competencies within the seven sectors, the degree to which horticulturists are seen to have prepared themselves for their careers, the attributes or qualities employers expect of a qualified horticulturist and the values applicable to the horticulture profession.

This research is regarded as exploratory as little documentation exists regarding the competencies being applied by horticulturists within the different sectors. As it describes the characteristics of horticulture education and training and tries to understand the meaning and relevance of the data gathered, it may also be defined as descriptive. It is also an applied research study as its focus is on the sector-specific curriculum development needs in the horticulture industry. A triangulation approach to the study was followed that utilised a quantitative as well as a qualitative approach. This served to heighten the reliability and the validity of the research. In the qualitative approach, use was made of both personal and focus group interviews, which enabled the researcher to study the problem at greater depth. The mail survey, which used a self-administered questionnaire, facilitated the collection of empirical data that was used to corroborate and extend the generalisability of the qualitative findings to a national level and was the quantitative approach followed.

While the situational analysis has led to an extensive amount of empirical data relative to the revision of the curricula, the development of a theoretical curriculum framework is seen as the logical conclusion of this analysis as it represents a synthesis of the most important findings of the study. Its presentation to the industry as a concept curriculum framework, upon which a revised curriculum for technikon horticulture training may be

based, is recommended. The development of a framework structured in a format compatible with the NQF, aims at meeting the curriculum needs of the different sectors of the industry.

OPSOMMING

Die kurrikula van die Technikons se Nasionale Diplomas in Tuinbou, Landskaptegnologie en Parke- (Oopruimte) en Rekreasiebestuur is sedert die instelling van die ND in Tuinbou in 1972, by tye verander. Die tekortkominge in die proses van kurrikulumhersiening, met spesiale verwysing na programme in Tuinbou, is uitgewys. Die instelling van uitkomsgebaseerde onderwys en die Nasionale Kwalifikasieraamwerk (NKR) het op die proklamasie van die Suid Afrikaanse Kwalifikasie-Owerheid Wetsontwerp (No. 58 van 1995) gevolg. Alle kurrikula word tans in leeruitkomstes wat kwalifiserende leerders sal moet kan demonstreer, omskryf.

Hierdie navorsing berus primêr op die uitgangspunt dat 'n belangrike voorvereiste vir die ontwerp of herontwerp van 'n tersiêre vlak-kurrikulum vir tuinbouopleiding op 'n geldige, wetenskaplike situasie-analise gegrond moet wees. 'n Situasie-analise wat die sektore van Baangras, Blommekweek, Boomteelt, Gemeenskapstuinbou, Kwekerykleinhandel, Kwekeryproduksie en Landskap insluit, is onderneem. Die resultate van hierdie situasie-analise sou vir die ontwikkeling van 'n teoretiese kurrikulumraamwerk tydens kurrikulumhersiening benut kon word.

Die sekondêre doel van hierdie studie is aanvullend tot die primêre doel aangesien die resultate van die situasie-analise tot die identifisering van die kern- en spesifieke vaardighede/bevoegdhede binne die sewe sektore sou kon bydra. Die mate waartoe tuinboukundiges hul met sukses vir hul loopbaan voorberei het, die eienskappe wat 'n werkgewer van 'n gekwalifiseerde tuinboukundige sou kon verwag en die waardes wat op die tuinbouprofessie van toepassing is, word ook hierdeur geraak.

Hierdie navorsing is verkennend van aard aangesien daar min literatuur beskikbaar is met betrekking tot die bevoegdhede wat deur tuinboukundiges in die verskillende sektore toegepas word. Aangesien dit die eienskappe van tuinbouopvoeding en -opleiding beskryf en 'n poging is om die betekenis en relevansie van die ingesamelde data te verstaan, kan dit ook as beskrywend beskou word. Omdat die fokus op die spesifieke kurrikulumontwikkelingsbehoeftes van die tuinboubedryf geplaas is, is dit ook 'n toegepaste studie. 'n Triangulasiebenadering tot die studie is gevolg waardeur van beide 'n kwantitatiewe en 'n kwalitatiewe benadering gebruik gemaak is. Die betroubaarheid en die geldigheid van die navorsing is hierdeur verhoog. Die kwalitatiewe benadering het van persoonlike en fokusgroeponderhoude gebruik gemaak, wat aan die navorser die geleentheid gebied het om 'n diepgaande ondersoek te doen. Die kwantitatiewe benadering, waar van 'n posopname met 'n self- ingevulde vraelys gebruik gemaak is, het die insameling van empiriese data moontlik gemaak. Hierdie data kon gebruik word om die kwalitatiewe bevindinge tot by 'n nasionale vlak te verbreed.

Die situasie-analise het 'n groot hoeveelheid empiriese data, wat op die hersiening van die huidige kurrikula van toepassing is, opgelewer. Die ontwikkeling van 'n teoretiese kurrikulumraamwerk word as die logiese gevolgtrekking van die analise beskou aangesien dit die sintese van die belangrikste bevindinge verteenwoordig. Die

aanbieding hiervan aan die bedryf as 'n konsepkurrikulumraamwerk waarop tuinbou-opleiding by technikons gebaseer kan word, word aanbeveel. Hierdie konsepraamwerk is in 'n formaat wat met die NKR verenigbaar is, ontwikkel en is geskoei op die realisering van die kurrikulumbehoeftes van die bedryf en sy afsonderlike sektore.

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CONTENTS

TABLES

FIGURES

DEFINITIONS, CONCEPTS, ACRONYMS AND GLOSSARY SAQA TERMINOLOGY

1. DEFINITION OF TERMS, CONCEPTS AND ACRONYMS

ABET	:	Adult Basic Education and Training
ASF	:	Australian Standards Framework
BTech	:	Baccalaureus Technologiae
CAD	:	Computer Aided Design
CHE	:	Council on Higher Education
CPD	:	Continuing Professional Development
CTP	:	Committee of Technikon Principals
Curriculum	:	A plan or blueprint for instruction
DoE	:	Department of Education
DTech	:	Doctorae Technologiae
DVCA	:	Deputy Vice Chancellor Academic
ETQA	:	Education and Training Quality Assurance body
Experiential learning:		Also called co-operative education: Refers to the term spent by technikon learners in workplace training
FET	:	Further Education and Training
Field of learning	:	Representation of a cluster of like skills and or competencies (own definition)
GET	:	General Education and Training
GDP	:	Gross Domestic Product
HE	:	Higher Education
HEQC	:	Higher Education Quality Committee (of the CHE)
HET	:	Higher Education and Training
Horticulture	:	i.e. the profession that utilises plant material for a variety of uses, viz. aesthetic, food, shelter, recreation. Also known as Amenity Horticulture and includes the recognised fields of Horticulture, Landscape Technology and Open Space and Recreation Management
IERM (Africa)	:	Institute of Environment and Recreation Management (Africa)
LIA	:	Landscape Irrigation Association

MTech	:	Magister Technologiae
NAP	:	New Academic Policy
NATED	:	National Training and Education Department
NCHE	:	National Commission on Higher Education
NGO	:	Non-Governmental Organisation
ND	:	National Diploma
Needs assessment	:	An empirical and judgmental process for identifying human needs and establishing priorities among them
Need	:	A discrepancy between a present and a preferred state
NQF	:	National Qualifications Framework
NSB	:	National Standards Body
NVQ	:	National Vocational Qualification (UK)
OBE	:	Outcomes-Based Education
OBET	:	Outcomes-Based Education and Training
PBL	:	Problem Based Learning
PBR	:	Problem Based Research
QA	:	Quality Assurance
RPL	:	Recognition of Prior Learning
SALI	:	South African Landscape Contractor's Institute
SANA	:	South African Nurseryman's Association
SAQA	:	South African Qualifications Authority Act, 1995 (Act No 58 of 1995)
SAUVCA	:	South African Universities Vice Chancellors' Association
SERTEC	:	Certification Council for Technikon Education
SETA	:	Sector Education and Training Authority
SGB	:	Standards Generating Body
SGB OHL	:	Standards Generating Body: Ornamental Horticulture and Landscaping
SGG	:	Standards Generating Group
Situational analysis	:	Analysis, synthesis and evaluation of curriculum needs and commensurate recommendations
Training	:	Includes formal education and training and also informal training
WPTA	:	Western Province Turfgrass Association

2. GLOSSARY OF SAQA CONCEPTS AND TERMINOLOGY

Applied competence: The ability to put into practice in the relevant context the learning outcomes acquired in obtaining a qualification

Core learning: That compulsory learning required in situations contextually relevant to the particular qualification.

Credit: That value assigned to a given number of notional hours of learning. One SAQA credit equals 10 notional hours. 120 SAQA credits are equivalent approximately to one year of full-time study.

Critical (cross-field) outcomes: Those generic outcomes determined by SAQA, which inform all teaching and learning and including but not limited to:

(a) Identifying and solving problems in which responses display that responsible decisions using critical and creative thinking have been made.
(b) Working effectively with others as a member of a team, group, organisation, and community.
(c) Organising and managing oneself and one's activities responsibly and effectively.
(d) Collecting, analysing, organising and critically evaluating information.
(e) Communicating effectively using visual, mathematical and or language skills in the modes of oral and or written persuasion.
(f) Using science and technology effectively and critically, showing responsibility towards the environment and the health of others.
(g) Demonstrating an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation.
(h) Contributing to the full personal development of each learner and the social and economic development of the society at large, by making it the underlying intention of any programme of learning to make an individual aware of the importance of:

(i) Reflecting on and exploring a variety of strategies to learn more effectively;
(ii) Participating as responsible citizens in the life of local, national and global communities;
(iii) Being culturally and aesthetically sensitive across a range of social contexts;
(iv) Exploring education and career opportunities; and
(v) Developing entrepreneurial opportunities.

Elective: A range of options from which students must make a choice in structuring a course of study.

Exit level outcomes: Specifications of the knowledge and skills that a learner should have acquired by the time he or she exits a programme and is awarded a qualification, demonstrated through assessment.

Fields and sub-fields of learning: The twelve fields of learning identified by SAQA that represent the divisionalisation of all learning, each with its own purpose and broad boundaries. Each field includes sub-fields identified by NSBs as having their own discrete scope and contents.

Fundamental learning: That learning which forms the grounding or basis needed to undertake the education, training or further learning required in the obtaining of qualification.

Learnerships: A structured learning programme, which includes practical work experience, and leads to an occupationally related qualification on the NQF.

Module: A course or unit of learning; the units which make up a programme and its qualifications; these are usually described as *core* (compulsory) or *elective* (a range of options from which students must make a choice). OR A coherent self-contained unit of learning, designed to achieve a set of specific learning outcomes assessed within that unit of learning. The building block from which a programme and its qualifications are constructed.

Notional hours of learning: The learning time that it is conceived it would take an average learner to meet the outcomes defined, and includes concepts such as contact time, time spent in structured learning in the workplace and individual learning. One credit is the equivalent of 10 notional hours of learning.

Outcomes-Based Education: A learner-centred, results-oriented approach to learning based on a philosophy that focuses on the learner and his/her needs, acknowledges human diversity, emphasises accountability, participatory and democratic decision-making in education and allows learners to achieve their full potential.

Outcomes: The contextually demonstrated end-products of the learning process.

Programme: A purposeful and structured set of learning experiences leading to one or more qualifications, usually comprised of a set of credit-rated, level-pegged modules or unit standards; in an outcomes-based system a programme is designed to enable learners to achieve pre-specified exit level outcomes.

Qualifications: The formal recognition and certification of learning achievement awarded by an accredited provider. In the outcomes-based approach intrinsic to the NQF, a qualification signifies the demonstrated achievement by a learner of a planned and purposeful combination of learning outcomes, expressed as an accumulation of credits at a specified level of performance.

Qualification descriptors: The generic specifications, purpose and characteristics and articulation possibilities for a recognised qualification type.

Registration: SAQA registers qualifications and standards on the NQF

Specific outcomes: As contextually demonstrated knowledge, skills and values, specific outcomes are achievements learners should be able to demonstrate in a specific context in particular areas of learning at a specific level. Include one or more critical outcomes.

Unit Standards: Refers to registered statements of desired education and training outcomes and their associated assessment criteria together with administrative and other information as specified in the Regulations. OR Units of learning which are standardized through the SAQA standards generation process and then registered on the NQF. These may be offered in the education and training system either as "stand-alone" discrete units of learning, or they may be combined in a purposeful manner to form a qualification.

(Sources: Du Pré 2000, DoE 2002 & SAQA 1998b)

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION AND ORIENTATION

The tertiary training of horticulturists in South Africa is primarily undertaken at the five technikons that offer either one or more of the available programmes. Training has traditionally been to National Diploma (ND) level and the largely overlapping National Diplomas in Horticulture, Landscape Technology and Open Space and Recreation Management have become the benchmarks for horticultural training. The ND Horticulture can be regarded as the central pillar with in excess of 80% of all students registering for this course. The ND Landscape Technology provides horticultural training for the landscape design and construction sector and the ND Open Space and Recreation Management, horticultural training for the municipal, parastatal and state sectors. The BTech, MTech and DTech degree programmes have replaced the higher diploma courses and have added a new dimension to horticultural training. These programmes were instituted in 1996. Their acceptance by the industry and popularity amongst students may best be judged once graduates have been in the industry for at least five to 10 years.

The training of horticulturists for the green industries, i.e. the nursery, landscape, environmental, amenity and other sectors, provides trained personnel for a large industry with a substantial workforce and a substantial contribution to the Gross Domestic Product (GDP) of the country. Much of this workforce is unskilled and is heavily reliant on the guidance of qualified horticulturists. As the management of this workforce is vital to the future of both the industry and the country, the training of horticulturists is of prime importance.

The South African Qualifications Authority Act, 1995 (No. 58 of 1995), provides for the institution of outcomes-based education (OBE) and training in South Africa and the registration of all qualifications on the National Qualifications Framework (NQF). The opportunity which arises from this is that of renewed curriculum planning. Serious deficiencies have existed for many years in the curriculum development of horticultural training in South Africa (Laubscher 1993: 157). These are addressed in this study. This

research has been aimed at the first stage of the curriculum design process, i.e. situational (or needs) analysis, and has striven to set the stage for a revision of existing programmes in horticulture.

The following paragraph aims to describe the background to the problems addressed by this research study. The inadequacies of past procedures that were followed in the development of curricula in Horticulture will be discussed against the broad background of applicable legislation and directives of the Department of Education. This background is concluded with a description of the changes that have been brought about by the statutory structures that have evolved directly from the Government's adoption of OBE and the formation of the South African Qualifications Authority (SAQA).

1.2 BACKGROUND TO THE PROBLEM

The development of horticultural training in South Africa is described in the following paragraph and this is followed by a description of how education and training in horticulture has been affected by the reforms in education and training since 1994. The urgency of undertaking a situational analysis in the horticultural industry, as part of curriculum design, is discussed in the light of the advent of outcomes-based education and training. The changes that have been initiated by SAQA since that time (and are currently still continuing) and the effect of these on this industry will be evaluated.

1.2.1 Horticultural training at Technikons

The ND Horticulture was instituted for the first time in 1972 at the Pretoria College for Advanced Technical Education (now the Pretoria Technikon) and since then the curriculum has been changed three times, namely in 1979, 1991 and 1996 (author's experience). These changes to the curriculum have usually been quite substantial, as illustrated by the following:

The revision changes in 1979 saw the re-allocation of part of the syllabi material into modified subjects, with new subjects names. The changes in 1991 saw the ND Horticulture split into two diplomas, a revised and more specialised ND Horticulture and the new specialisation for the landscape construction and maintenance sector, the ND Landscape Technology. The subject Horticultural Management (and its equivalent for the

ND Landscape Technology) was also introduced to the third semester level for the first time. A further re-allocation of syllabi material was instituted at this time, with subject names changing again (e.g. Plant Material Studies was instituted for the first time; it would be offered to the third semester level and it would consolidate all subjects that had a botanical, plant knowledge and plant utilisation emphasis).

The course ND Parks and Recreation Administration (later Management), a horticultural course for municipal and public authority horticulturists and recreation managers, had always been run concurrently with the ND Horticulture. The subject Parks Management had from inception been offered up to the third semester level. This National Diploma was brought into line with the other two diplomas in 1991, so that a commonality of 75% in content existed between the three diplomas (Laubscher 1993: 157-171). The curriculum change in 1996 (which led to the current course) was less severe and served to strengthen the specialised directions in Horticulture, Landscape Technology and Parks (changed to Open Space) and Recreation Management. The BTech degrees in each of the three specialisations were also instituted at this time and the latter curriculum changes served to ensure that students could progress from their first year through to the diploma (three years) and the BTech (four years). Elective subjects were eliminated and students were no longer able to specialise after completing their first semester, but had to select a specific direction before their first registration.

These regular changes to the horticultural curricula have made it difficult for the industry members, students, lecturers and the general public to know what skills or competencies one may expect of a qualified horticulturist. This has especially been the case with members of the horticulture industry and the general public, both of whom do not generally have the time or inclination to keep up to date with details of curriculum changes. All of the earlier curricula have been content-based and curriculum revision discussions have been founded upon the relevant subjects. Very little consideration has been given to the skills or competencies that may be required of a qualified horticulturist. It is the researcher's experience that in discussions concerning curriculum, delegates all assume that some form of commonality and general consensus exists as to the skills and competencies required.

The changes that have been implemented over the years since the institution of the ND Horticulture in 1972 have never been based on empirical research, but have been based

on discussions between technikon staff and members of the industry through what are commonly called Advisory/Industrial Liaison Committees (Laubscher 1993: 178). As means of demonstrating the point that the development of a curriculum cannot simply be based upon a round of discussions or at the request of one or more parties, the following example of an actual curriculation incident is cited. The introduction for the first time in 1991 of management to the third level of the horticulture curriculum, was done largely at the request of the professional industry bodies. Despite a clear need being expressed by the bodies concerned, at a curriculation meeting held between the Cape and Peninsula Technikons and members of the industry, held on 9 March 1999 (see Appendix 1.1), consensus could not be reached as to what competencies nor what level of management skill was required of a diplomate. The industry members were virtually unanimous in a demand that this should be on a basic level of skill only, despite the fact that Management is a major subject in the present curriculum and several of those present were party to the development of the curriculum.

The institution at this time of a formal situational (needs) analysis is considered as essential in identifying the competencies required of a qualified diplomate, primarily because of the current institution of outcomes-based education in South Africa. The urgency of revising the current curriculum has been expressed at several forums. These have notably included the quality assurance inspections held by the Certification Council for Technikon Education (SERTEC) at the Cape Technikon (SERTEC 1998 & Cape Technikon 2001).

It is this researcher's thesis that one of the primary reasons for the current state of flux in the curriculum for Horticulture is that an objective analysis of skills or competencies has not been undertaken in the past. It is his contention that subjective experience and opinion have been relied upon in earlier curriculum revisions and these have not been based upon empirical research.

In the light of the above statement and the fact that advisory/industrial liaison committees have in the past been the primary organ of curriculum development, a discussion follows of the purpose and functions of advisory/industrial liaison committees.

1.2.1.1 Advisory/industrial liaison committees

The Work Committee: Curriculum Development of the Human Sciences Research Council (HSRC) in its report into education (HSRC 1981: 20) states that "advisory curriculating committees" exist at each technikon for each field of study. Their function is to keep in touch with developments in industry and the organisations that train "technicians" and that curricula and syllabi are adapted within the framework of existing regulations as and when required. The purpose of an advisory or industrial liaison committee is listed in the authoritative Committee of Technikon Principals' (CTP) publication *Essentials of Co-operative Education Practice* (CTP 2000: 23) as "... to **facilitate two-way communication** on academic matters between a technikon and the community it serves". The same publication (CTP 2000: 23) states that these committees have the following functions:

- To advise technikon staff in defining the objectives of the programme and on the specific skills needed by the learners to achieve the objectives
- To assist in the development of a curriculum to meet those needs
- To assist in the evaluation of the programme of study and the curriculum
- To advise the technikon on changes in the labour market which may affect the employment of trainees and graduates
- To assist the technikon in field placement of learners for experiential training, and placement of graduates, where this is possible
- To advise the technikon on requirements for new programmes and the revision of existing programmes of study to meet new developments in the workplace
- To monitor and report on availability and relevance of laboratories, laboratory equipment and infrastructure required for all programmes and curricula
- To assist the technikon in placement of staff for sabbaticals and/or industrial experience.

Whereas the concept of co-operative education is fundamental to technikon education and is the primary reason for the assertion made by technikons that their students are "workplace ready", this is to a large extent reliant on the willing assistance of employers in both the state and the private sectors. In the extract above, all of the functions listed by the CTP have been quoted for the sake of entirety and it is clear from these that advisory committees have a major role to play in the curriculum development of technikon programmes. In a letter from the Quality Assurance Committee to the Senate (Cape

Technikon 1999b), the former states of advisory committees in operation at the Cape Technikon, that the meetings "... do not always seem to be fully exploited as regular meetings with industry on the latest developments, curriculum (re)design, generation of work stations, etc. as well as fostering an interest in research". The limitation of the functions of advisory committees to advisory powers may be one of the reasons why programme leaders are reportedly not utilising advisory committees to their fullest extent.

To underline this researcher's contention in the foregoing paragraph that curriculum development in Horticulture has not been based upon empirical research and has relied on the "advice" of advisory committees, an analysis of the above functions indicates that the words *advise* or *assist* occur in seven of the eight listed functions. The functions performed by advisory committees are laudable and invaluable in the execution of co-operative education. These functions however do not include, nor do they even suggest a need for the execution of in-depth situational analyses or needs assessments as part of curriculum design.

The functioning of advisory committees at the five technikons that offer programmes in Horticulture has been invaluable in maintaining close contact with the horticultural industry over a period of many years. These committees, which meet on average on a bi-annual basis, have played a substantial role in the placement of learners, mentoring in the workplace, assessment of experiential learning and in advising on curriculum development. This has, however been on an advisory basis only and has never included any level of research. Advisory committees have furthermore generally been small and often not fully representative of the industry and this together with the lack of continuity in their membership has seriously negated the effectiveness of advisory committees.

The following paragraph describes the curriculum development procedure applicable to technikons. The current procedure is listed, but an historical overview of the policy of national programmes and convenor technikons is also provided, as these relate to curriculum development.

1.2.1.2 Curriculum development at Technikons

The nationalisation of technikon programmes is encapsulated in the parameters as set out in the Department of Education's Report 150 (DoE 1997) and Report 151 (DoE 2001a). In

these documents, content-centred subjects are listed per programme (e.g. ND Horticulture), with their credit rating indicating their "weight" in the teaching programme. Syllabi for each of these subjects were listed in several volumes that accompanied the Department of National Education's NATED 151 reports prior to 1994. Subsequent to this date, technikons were informed that syllabi would not be determined in general policy and that technikons would be able to determine their own syllabi (Department of National Education 1994: v-vi). Certain provisos were made, also that core syllabi would be kept by the CTP to "... ensure the national character ... and to promote articulation" (Department of National Education 1994: v-vi).

The system of convenor technikons is a mechanism by which those technikons offering the same programmes collaborate, usually with that industry's professional bodies, in ensuring that new and revised programmes are not approved before they are listed as formal programmes in NATED 151. The convenor technikon has the national responsibility of providing leadership in the revision and reformulation of existing qualifications and in developing new qualifications. The mechanism by which this is done is through the completion of a so-called Form B (*Application for Approval of the Introduction of a New/ Revision of an Existing Technikon Instructional Programme*)(Council on Higher Education, 2001). The DoE (1997: 20) state that the "... convenor technikon should clear the proposed instructional programme with all the other technikons as well as the industry/ and vocational councils/ bodies in question". After comments have been obtained from these and any other interested parties, the convenor technikon compiles a final Form B for approval of the CTP and submission to the DoE.

It should be noted that while the undertaking of a needs assessment or situational analysis is not specifically mentioned by the CTP as a prerequisite procedure prior to completing Form B (except that the proposals are to be "cleared" with the bodies listed above), the CTP (1995: 2) states that "... without a thorough analysis of the existing situation, the subsequent curriculum design activities cannot progress in a responsible manner".

While the annual NATED 151 documents, subsequent to 1994, no longer included subject syllabi, these were required in completing Form B and after approval of Form B, these were useful resources to technikons in ascertaining the content of subject syllabi. A large degree of national uniformity in course content has consequently been assured by this provision. The nationalisation of technikon programmes (and the national collaboration on

curriculum development) is expressly advanced by the system of convenor technikons. Genis (1997: 16) states that technikon programmes reflect "consensus curricula" and this has enabled technikons to practise reciprocal recognition and accreditation of learning.

In the most recent DoE Report 151, Volumes 1 and 2 (DoE 2001a & b) subjects (called "Instructional Offerings") are tabulated with their codes, credits and a remarks column in which instructions on compulsory and optional instructional offerings and points of exit are listed.

Technikons were advised by the Council on Higher Education of the revision of Form B on 4 September 2001 (CHE 2001). The only difference between the earlier version and the Revised Form B is that the indication of subject content into A-, B- and C- type content in all new applications for revision (or new programmes) has been discontinued. The DoE (1997: 12) specify A- type subject content as the mastery of manual skills and crafts, B- type as the application of existing knowledge and technology relating to a specific vocation or industry and C- type as the mastery of basic theoretical structures and the inculcation of fundamental principles of scientific thought and method.

The division of course content into the above levels of ascending "theoretical complexity" is clearly a remnant of the previous content-based curricula and has been discarded in the Revised Form B because of its replacement by the outcomes-based fundamental, core and elective outcomes.

The CTP have at the time of writing (September 2002) not yet rescinded Revised Form B, which one understands will remain in force until a new outcomes-based directive on programme revision is finalised. While the existing qualifications have received interim registration by SAQA, full registration on the NQF is to take place before June 2006.

The effects of the adoption by the Government of National Unity in 1994 of an outcomes-based approach to curriculum development in education and training in South Africa will be briefly highlighted below. The effects of the South African Qualifications Authority Act (No. 58 of 1995) and the National Qualifications Framework upon education and training in general as well as that specific to the horticultural industry will be subsequently discussed.

1.2.2 Curriculum development in outcomes-based education and training

The South African Qualifications Authority Act (No. 58 of 1995) and the Higher Education Act (No. 101 of 1997) signalled the Government's intention to restructure Higher Education in South Africa. Providers of educational programmes were compelled to plan and deliver academic courses using the proposed programmes and outcomes-based approach. It is particularly the National Qualifications Framework, which as one of the central pillars of the restructuring initiated by the Department of Education, heralded a new way of looking at qualifications. Qualifications and standards registered on the NQF were to be described in terms of learning outcomes that qualifying learners were expected to be able to demonstrate. The White Paper on Education and Training (Government Gazette 1995: 15) encapsulated the philosophies of the new policies in the following statement:

> "Successful modern economies and societies require the elimination of artificial hierarchies, in social organisation, in the organisation and management of work, and in the way in which learning is organised and certified. They require citizens with a strong foundation of general education, the desire and ability to continue to learn, to adapt to and develop new knowledge, skills and technologies, to move flexibly between occupations, to take responsibility for personal performance, to set and achieve high standards, and to work co-operatively."

This approach to learning places great emphasis on learning as a journey, that the qualities of learning takes place throughout the time that the learner travels along this road. Cosser (1998: 7) states that for many South Africans, learning in the earlier content-based approach has been a journey that has meant variously and in combination, the following:

- memorising information for regurgitation in a summative examination
- being coached expressly for such examination
- adopting a superficial approach towards learning
- being passive recipients of 'knowledge', and passively failing to question their educators or trainers
- being unable to apply information or knowledge in new (or indeed any) situations
- looking for 'the one right answer' to questions and problems

- taking little or no responsibility for their own learning
- failing to learn from their own mistakes.

A bias has existed in the past towards this "qualification-as-destination" approach, whereby it was believed that unless a new qualification was embarked upon, learning for life was over. This conception is far removed from the approach being espoused in the outcomes-based approach as conceptualised in the NQF. The profile of the kind of learner who will be equipped to deal with the demands of the 21st Century, will be a "flexible generalist", persons who Ball (1996, quoted in Cosser 1998: 8) says will have to face ever-increasing longevity and will need to be equipped with the necessary knowledge, skills and values to adjust readily to multiple career changes and in their own personal development, will have to make a significant contribution to the life of the country and the world. Cosser (1998: 8) states that in his opinion a national qualifications framework that encourages life-long learning seems ideally poised to realise this vision.

The structure of the NQF and its primary functions will briefly be described below:

1.2.2.1 The National Qualifications Framework

The SAQA Act of 1995 provides for the establishment of the South African Qualifications Authority as well as for the development and implementation of a National Qualifications Framework. The primary function of SAQA as listed in its *Annual Report to Parliament for 1997/1998* is to pursue the objectives of the NQF, which were listed as:

- Creating an integrated national framework of learning achievements
- Facilitating access to, and mobility and progression within, education, training career paths
- Enhancing the quality of education and training
- Accelerating the redress of past discrimination in education, training and employment opportunities; and thereby
- Contributing to the full personal development of each learner and the social and economic development of the nation at large.

(SAQA 1998a: 3)

The NQF promotes the integration of education and training in South Africa. It offers learners multiple entry and exit points, mobility and the portability of credits, whether these are earned in the academic or the vocational sectors. The functioning of the NQF presupposes the establishment of both unit standards and qualifications, which form the building blocks for progress on the NQF. These will be registered with SAQA once they have been approved and recommended to SAQA for registration by the relevant National Standards Body (NSB) for that discipline or organising field.

The NQF provides for eight distinct levels of learning achievements. All credits, unit standards and qualifications, once registered with SAQA, as detailed by Du Pré (2000: 10) in his comprehensive booklet *SAQA & the NQF: An introduction to outcomes-based programme development,* will be identified by a unique description on the NQF. The NQF will allow, *inter alia*, for the following:

- Integration of education and training
- Coherence and flexibility for moving within and through levels
- Standards for education and training expressed in terms of outcomes
- Access to all learners, progression through levels and portability (transfer of credits between learning institutions/employees)
- Recognition of prior learning obtained through formal, non-formal and informal learning and for experience.

The establishment of the NQF provides for Education and Training Bands and within the framework of the three bands, learners will be enabled to earn credits after being assessed against clearly defined standards. SAQA (1998b: 4-5) defines unit standards as education and training outcomes and outcomes as contextually demonstrated end-products of the learning process. The Higher Education and Training Band (HET) is made up of NQF levels 5-8 which lead to the achievement of diplomas, occupational certificates, first degrees, higher degrees, doctorates and further research degrees. The SAQA Act defines a qualification as "the formal recognition of the achievements of the required number of the range of credits and such other requirements at specific levels as may be determined".

Breier (2001: 24) states that in a major concession to the higher education sector, SAQA has "... allowed the registration of whole qualifications as well as unit standards".

Qualifications have to be written in outcomes-format, designating outcomes as fundamental, core and elective. These indicate in order, a progression from learning which is considered as a grounding, to that which is contextually relevant to a particular qualification, to that which is specific to the purpose of the qualification. (SAQA's full definitions of these are indicated in the list of terms on Page xix.)

The DoE's *A New Academic Policy for Programmes and Qualifications in Higher Education (2002)* proposes a two-track National Qualifications Framework, which with a career-focused track and a general track, will facilitate greater access, mobility and individual progression. This document also proposes an additional two levels to the Framework. As this document is currently still under discussion, its content will not be further discussed in this dissertation.

The following paragraphs will describe firstly the procedure that was followed in submitting technikon qualifications for interim registration and secondly the procedure that is currently being followed in submitting interimly registered qualifications for full registration.

1.2.2.2 Registration of Technikon qualifications on NQF

The SAQA Regulations under the SAQA Act, 1995 (No. 58 of 1995) spelt out the procedure that was to be followed in obtaining interim registration of qualifications on the NQF. Regulation 11 listed the format that was to be used in submitting a qualification for interim registration and this was to include *inter alia:* references to the purpose of the qualification, assumptions of learning prior to commencement of learning, exit level outcomes, total credits required, integrated assessment and articulation possibilities. The procedure to be followed in the interim registration of technikon qualifications on the NQF is described below.

1.2.2.2.1 Interim registration of qualifications

A transitional period of five years (i.e. from 1 July 1998 to 3 June 2003) was set for the interim registration of qualifications on the NQF (SAQA 1998b: 11). The submission to SAQA of all technikon qualifications for interim registration (by June 2000) was completed using a manual, *Technikon Qualifications of the NQF* (Genis, 1999). The Working Group for NQF Implementation (a sub-committee of the Committee for Tutorial Matters (CTM) of

the Committee of Technikon Principals - CTP) developed this manual as an aid to the technikon sector in meeting the requirements of SAQA, as reflected in the Regulations under the South African Qualifications Authority Act. The Group prepared a development programme leading up to the actual tasks required for the interim registration of technikon qualifications by SAQA.

The process followed by the Convenor Technikon (Cape Technikon) in preparing its submission for the interim registration of Horticulture qualifications was initiated by a joint meeting of the advisory committees of the Cape and Peninsula Technikons (see Appendix 1.1 for minutes). This was held on 9 March 1999 at the Cape Technikon and staff members of the Cape and Peninsula Technikons and selected stakeholders from various employers, professional bodies, research and botanical institutions and past students participated. A workshop format was used with an experienced facilitator who co-ordinated the five panels who utilised focussed group interview procedures in determining the required outcomes. The results of the panel meetings were later synchronised and consensus reached on the purpose statement and outcomes (See Appendix 1.1). A purpose statement and a set of exit level outcomes for the ND Horticulture were determined. This exercise revealed that focus groups representative of the various stakeholders were a valuable research tool in curriculum development.

At this meeting, the sectors of the industry, exit level outcomes, specified outcomes and a purpose statement for the ND Horticulture were identified. These were subsequently used to develop the same for the ND Landscape Technology and the ND Open Space and Recreation Management. The other Technikons that offer these courses were asked to meet with their advisory committees and were offered the minutes of the meeting referred to above as starting point. The interim registration documents were subsequently prepared by the Cape Technikon, based upon the outcome of the advisory committee meetings. The documents were also circulated for perusal to the other Technikons that offer these courses and following the execution of minor changes; the interim registration documents were then submitted to the CTP for control purposes, who then directed them on to SAQA.

A large overlap in exit level and specific outcomes was evident in the three National Diplomas because of the similarity in the jobs for which the courses prepare their

candidates. The following exit level outcomes were identified by the joint meeting of advisory committees (see Appendix 1.1):

- Apply appropriate plant production techniques
- Utilise plant material
- Maintain plants
- Apply operational procedures
- Communicate professionally

The process followed in determining the exit level and specific outcomes for interim registration was executed as specified by the Working Group for NQF Implementation and although it was a narrow consultative process, it did produce the results it was commissioned to produce. It did result in a greater measure of reflection upon the state of the curriculum of the three courses than had ever been undertaken before. The process did not however provide for an in-depth examination of the functions being performed by practitioners within the seven sectors identified in this study. It provided only for a global overview of the industry, subdivided into the categories represented by the National Diplomas in Horticulture, Landscape Technology and Open Space and Recreation Management. While the process followed did attempt to be as inclusive as possible, it could still be regarded as a top-down approach because the advisory committee meetings were primarily representative of academic lecturers and experiential training providers. This study will attempt to ensure that a bottom-up approach is utilised, which begins with the identification of basic skills/competencies and is represented by the broadest cross-section of the industry as possible.

The procedure currently (September 2002) being followed by technikons in submitting qualifications to SAQA for full registration is described below.

1.2.2.2.2 Full registration of qualifications

All of the existing technikon programmes in Horticulture received interim registration on the NQF, in accordance with the NSB Regulations [(II)(I)(b) and (c)] as gazetted on 28 March 1998 under the SAQA Act No. 58 of 1995 (SAQA 2001b: Letter to CTP, 21 November). The process to be followed by Convenor Technikons in obtaining full registration of

interimly registered qualifications has been detailed in two directives of the CTP to Technikons (CTP 2002a & 2002b: Circular letters, 4 June & 6 August).

The process referred to requires that Convenor Technikons initiate the registration process and include Non-Convenor Technikons in the review process. Once the draft submissions have been circulated to all other technikons, comments are to be awaited and incorporated into the submissions. The draft submissions were to be submitted to the CTP by 30 November 2002, upon which the CTP would have provided feedback on these. Convenor Technikons would then be expected to finalize the drafts and re-submit to the CTP office by 12 April 2003. The process of obtaining full registration on the NQF referred to above has been based upon a format template, SAQA's *Format template in using the criteria for the generation and evaluation of qualifications and standards within the NQF* (SAQA, 2001a). This has been adapted by the CTP for use by technikons. Section C (Qualifications) of this template refers to the "Form and substance of the qualification" and it is this in particular that the CTP has developed into the template referred to (CTP 2002a).

In the second letter from the CTP (2002b), technikons were informed that the NQF Core Curriculum Workgroup had taken a decision to change the initial process (as outlined in the letter of the CTP, 4 June 2002). The release of the NAP (*New Academic Policy for Programmes and Qualifications in Higher Education)* document and the NQF Study Team Review, which were expected at the end of October 2002, had necessitated the revision of the process. Following the release of these documents, the Workgroup Co-ordinators would revise, plan and interpret the documents and the information would be distributed to institutions by the end of 2002 or by early 2003. The circulation to Non-Convenor Technikons would then take place by early February 2003 as institutions are expected to continue reviewing their qualifications internally and to forward the comments to the CTP.

The Cape Technikon, as Convenor Technikon, is currently (September 2002) revising the interimly registered qualifications for circulation to Non-Convenor Technikons, as specified in the process outlined above. The NAP discussion document (DoE 2002) is being treated as a discussion document and not as policy at this stage. All staff involved in the review of qualifications have been requested to focus on the quality of the rationale/purpose statements and the alignment of these with exit level outcomes, specific outcomes and assessment criteria (Cape Technikon 2002b: Letter to Convenors, 4 June). This process

is an interim measure and will be superceded by the outcome of the Curriculum Workgroup Co-ordinators' study of the NAP document and NQF Study Team Review Report.

In a further development, Convenors at the Cape Technikon were informed (Cape Technikon 2002c: Letter to Convenors, 19 August) that the SAQA Board had approved on 14 August 2002 the proposal that "... all interim registered qualifications be fully registered on the NQF for 3 years, i.e. from 1 July 2003 until 30 June 2006 ...". This letter states furthermore that while the SAQA Board has provided more time for the technikon's curriculum design exercise, this process should certainly be completed by June 2004.

At a meeting held on 12 April 2002 between the heads of departments of the five technikons offering horticultural programmes, a decision was taken not to revise the horticultural programmes that were interimly registered on the NQF, prior to their submission for full registration. Furthermore, that a process of revision would nevertheless be initiated immediately, but that this would only be submitted in due course when greater clarity on the outcomes-based format of revision procedures had been determined.

The process to be followed in obtaining full registration of qualifications on the NQF has been set out in this paragraph and while the submission date has been extended, the process of obtaining full registration needs to be followed without further delays. Curricula revisions should particularly be executed with urgency.

Following upon the above discussion of the registration procedure to be followed in registering qualifications on the NQF, the specific curriculum development effects of outcomes-based education and training on the sub-field of Horticulture will be explained.

1.2.2.3 OBE and the sub-field of Horticulture

Twelve National Standards Bodies (NSBs) were established by SAQA to represent SAQA's 12 organising fields. NSBs have *inter alia* the following responsibilities: defining and recommending to SAQA the boundaries of the field and within this, a framework of sub-fields, recognising or establishing SGBs within the framework of sub-fields and recommending the registration of qualifications and standards (SAQA 1998b: 3). The first of the fields, NSB 01, represents Agriculture and nature conservation. The following sub-

fields for the latter were indicated as an interim framework for sub-fields: Primary agriculture, secondary agriculture, nature conservation, forestry and wood technology and horticulture (SAQA 1999a: Brief report, 9 June). The categorisation of the organising fields followed much deliberation and does not indicate a clustering of all learning into mutually exclusive categories, but as stated by SAQA "... is an important step towards the systematic development of standards" (SAQA 1997: 8). The establishment of Standards Generating Bodies (SGBs) was to be based upon the prior approval of these identified sub-fields (SAQA 1998c: Brief report, 14 October). NSBs do have the prerogative to recommend the establishment of more than one SGB per sub-field if they believe that the standards and qualifications required in one sub-field cannot be generated by one SGB per sub-field (Cosser 1999: 11).

The SAQA Act, 1995 provides for the formation of SGBs, which are primarily responsible for the generation of unit standards and qualifications in accordance with SAQA requirements in identified sub-fields and levels, the update and review of standards and for recommending unit standards and qualifications to National Standards Bodies (SAQA, 1997: 12). According to Notice 1194 (Government Gazette 1999: 2), organisations proposing to nominate persons to SGBs should ensure that these persons:

a) will be able to consider issues of productivity, fairness, public interest and international comparability as related to education and training in the sub-field;
b) enjoy credibility in the sub-field in question, who enjoy respect; have the necessary expertise and experience in the sub-field and have the support or backing of the nominating body;
c) are able to advocate and mediate the needs and interests of all levels within the sub-field covered by the Standards Generating Body;
d) are able to exercise critical judgement at a high level; and
e) are committed to a communication process between the Standards Generating Body and the Constituency.

The above criteria place a serious responsibility on those nominating persons to a SGB. The accountability of those persons nominated is even greater because the nominees will, once their nominations are accepted, the nominees will be collectively responsible for the functions listed above.

The SAQA Status Report of 18 March 2002 lists the SGB for Ornamental Horticulture and Landscaping (SGB OHL) as being a registered Standards Generating Body, with Identification Number 1229 (SAQA 2002: 1).

A description follows below of the development of this SGB as this development relates to the identification of the seven sectors of the horticultural industry upon which this research is based. This is described in full, as the identification of the sectors used in this study is central to this research.

1.2.2.3.1 The identification of sectors in the sub-field of Horticulture

The Chairman of the Steering Committee for the Establishment of a SGB for the Horticulture and Landscape Industries (1999: Memorandum, 5 December) states that the Committee had recognised that the industry contains various fields of training activities and that it was working on a proposal to create five Standards Generating Groups (for each of the fields or domains identified). The latter were to be commissioned to assist the SGB in its activities. The following five domains were identified (listed in brackets is a brief explanation of the composition of each):

- Commercial horticulture and allied trade (growers, wholesale distributors, garden centres and commercial florists)
- Landscape architecture, planning and design (design and planning of natural and constructed landscapes)
- Landscape construction and maintenance (construction and maintenance of landscaped areas and sports turf)
- Amenity horticulture (parks and recreation, community services, botanical gardens and arboriculture)
- Landscape irrigation (design, construction and maintenance of irrigation for landscaped areas).

The Steering Committee (2000: Minutes of meeting, 12 June) referred to above resolved to commission Standards Generating Groups (SGGs) to write unit standards for each of the sectors of the industry for which an SGG had been appointed. The minutes of this

meeting do not indicate to what level these were to be written. The following SGGs were listed:

- Amenity horticulture
- Landscape architecture
- Commercial horticulture
- Landscape irrigation
- Floristry
- Resort management
- Landscape construction and maintenance
- Interior plantscape.

In a further development in identifying the domains or sectors of the sub-field Ornamental Horticulture and Landscape, the Steering Committee (2002: Letter to all SGB members, 23 January), identified the following "major groupings" in Ornamental Horticulture and Landscape (listed below in brackets are the sub-divisions within each grouping):

- **Landscape** (none indicated)
- **Amenity** (parks, cemeteries, islands, verges and sidewalks)
- **Sports turf** (rugby, soccer, bowls, golf, hockey, tennis and cricket)
- **Ornamental horticulture** (bedding plants, bulbs, cutflowers, ornamentals, potplants, roses, seeds and vegetables)
- **Landscape irrigation** (irrigation, water features, ponds, dams, boreholes and fertigation)
- **Commercial (retail)** (enterprises within the industry that trade with the end consumer, eg. retail shops, garden centres)
- **Allied** (all or any of the products within the industry which are not covered elsewhere).

Following upon the developmental work done by the Steering Committee for the Establishment of a SGB for Ornamental Horticulture and Landscape, the SGB (2002: Minutes, 18 June) at its first meeting, adopted the structures and organogram for the SGB as proposed by the Steering Committee. In this organogram, a Standards Review Committee is indicated that includes the following seven SGGs, representative of seven

sectors or domains. These are listed below and indicated in brackets the responsibilities of each of these sectors:

- **Plant Propagation** (production of shrubs, trees and all ornamental plant material for local and export markets, retail nurseries and landscapers)
- **Landscape Architecture** (planning and design of landscaping for civic, commercial and residential projects)
- **Amenity Horticulture** (provision and maintenance of gardens, parks and sports fields for cities, towns and public amenities)
- **Floristry** (design, marketing and implementation of floral arrangements)
- **Landscape Construction** (implementation and construction of landscaping for civic, commercial, sport and residential projects)
- **Sports Turf Grass** (establishment and maintenance of sporting facilities for golf courses, bowling greens and sports fields)
- **Landscape Irrigation** (design and installation of irrigation systems for civic, commercial, sport and residential projects).

The following governing institutions and associations represent the sectors listed above:

GCMA	Golf Course Managers' Association
IERM	Institute for Environmental and Recreation Management
ILASA	Institute for Landscape Architects of South Africa
IPSA	Interior Plantscapers of South Africa
LIA	Landscape Irrigation Association
SALI	South African Landscapers' Institute
SANA	South African Nurseryman's Association
	Floristry Association

The SGB also has representation from the full academic field, including agricultural colleges, technikons, universities and the informal training sector (SGB OHL 2002: Minutes, 18 June).

The SGB OHL (2002: Minutes, 18 June) states furthermore in its brief and purpose that it covers all aspects of the "green" industry. The Minutes continue to report that its "... role

players play an important part in the provision of world class facilities for recreation, civic amenities and sports facilities for visitors to and residents of South Africa".

The horticultural industry in South Africa is divided into sectors according to various professional and market factors and from the above discussion it is clear that unanimity on the division of the industry into sectors is unlikely. This researcher has utilised a division closely reminiscent of an Australian model that was tested amongst local members of the industry. An explanation of this division follows the discussion in the ensuing paragraph of international trends in OBE. The latter relate specifically to Horticulture.

1.2.2.3.2 The identification of sectors in the sub-field of Horticulture on international level

The United Kingdom's NVQs (National Vocational Qualifications) are worth noting in the identification of units and qualifications within industry sectors (Industry Lead Body Amenity Horticulture 1998: 1-2). These identify four levels of units and qualifications.

Within Level 2, for example, six qualification options are available, viz.

Hard landscape
Nursery
Decorative horticulture
Sports turf
Cemetery and graveyard
Interior landscaping

Similarly, in the Australian Horticulture Industry Competency Standards, (Douglas 1995: 59) the industry has segmented itself into seven sectors:

Floriculture
Turf
Nursery
Gardening
Arboriculture
Landscape

Production horticulture

Within the seven levels of the Australian Standards Framework (ASF), core skills/modules have been identified for each level, with an increase in complexity of competencies (outcomes) from level to level. The ASF I represents entry level training and in ASF 7 progression is through to management training. Douglas (1995: 60-61) presents a matrix, which indicates which competencies should be applied to each sector of the industry on each of the seven ASF levels.

In comparing the identification of sectors and also the competencies within each qualification framework level within the respective horticultural industries, viz. UK, Australia and South Africa, several differences are noted. Although these could be identified and compared, the idiosyncrasies of each country should be borne in mind.

The following paragraph describes the procedure followed by the researcher in determining the sectoral division of the industry in South Africa prior to his research.

1.2.2.3.3 The identification of sectors in the sub-field of Horticulture in this study

As mentioned in Paragraph 1.2.2.2.1 above, the joint meeting of the advisory committees of the Cape and Peninsula Technikons, held on 9 March 1999 was requested to identify the sectors of the horticultural industry (see Appendix 1.1). The following categories were established:

Allied commercial
Commercial plant and allied retail
Commercial plant wholesale production
Community horticulture
Consulting
Design and landscaping
Environmental
Floristry
Parks and recreation
Research, education and training
Turfgrass

The specific sub-sectors within each of the above are listed in Appendix 1.1.

In seeking to identify a realistic subdivision of the horticultural industry, the researcher felt it necessary to consider the following factors in determining the subdivision:

- The researcher's research focus, i.e. technikon education
- Suitability to the research techniques to be used in the researcher's study
- An ideal categorisation of between six and eight (suited to focus group technique)
- Mutually exclusive nature of categories (as far as possible)
- Consolidation of fragmented subdivisions into a workable categorisation
- Easily understandable material that makes sense to members
- SERTEC's Quality Panel's (Cape Technikon 1997 & Cape Technikon 2001) request that consideration be given to the urgent revision of the current programmes, particularly a revision from a specialist to a generalist focus
- Current professional institutes and associations
- Categorisation of employers, e.g. state, private, semi-state
- Core functions, e.g. cultivating grass for sport and recreation
- Categorisations applied internationally.

The most important criteria from the researcher's point of view was that the categorisation would be acceptable to industry members, that they would be able to identify with the categories and that they were implementable in the research. After taking the above criteria as well as the categorisations of both SGB OHL and international trends into consideration, the researcher opted for the following list of industry sectors. Their acceptability was duly discussed with members representative of the broader industry and once sanctioned, they were used throughout the study as representative of the horticultural industry. (It is noteworthy that this subdivision closely resembles the Australian model as listed in Paragraph 1.2.2.3.2 above.) The relevant sectors are:

Amenity horticulture
Arboriculture
Floriculture
Landscape

Nursery production

Nursery retail

Turf

It was mentioned in Paragraph 1.2.2.2.2 that the five technikons offering horticultural programmes had agreed to revise the existing programmes, but that this should be postponed until after the submission to SAQA of interimly registered qualifications for full registration (Cape Technikon, 2002a: Minutes of meeting of five Technikons, 12 April). Furthermore the meeting agreed that this should be done in SAQA's unit standards format as a warning had been raised by certain delegates to the meeting that the SGB OHL would require that unit standards be written for all levels of qualifications. It was expected that the SGB OHL would want a clear link between the unit standards on the different bands (GET, FET and HET) of the NQF. The writing of unit standards was to be done over the course of one year. This meeting decided that unit standards were to be written for each of the sectors of the industry. In deliberating upon the ideal categorisation of the industry, the meeting resolved to use the same categories that the researcher had decided upon. It should be noted that, acting as chairperson at this meeting, the researcher purposefully avoided influencing the meeting's decision in any way.

The following paragraph elucidates in as direct a means as possible the outcomes of the Cape Technikon's and SERTEC's quality assurance evaluation meetings, specifically as these relate to curriculum development. The advantage of this procedure is that the reader obtains an unbiased overview of the outcome of the evaluation exercises conducted in terms of SERTEC directives.

1.2.3 SERTEC quality evaluation of the Cape Technikon (2001)

SERTEC was constituted as a statutory body in terms of the Technikon Education Act (No. 88 of 1986), responsible for quality assurance and accreditation at technikons (Government Gazette 1986). SERTEC was in place until the establishment of an Interim Higher Education Quality Committee (HEQC) of the Council on Higher Education (CHE) in April 1999. The last SERTEC evaluation visits to technikons offering horticultural programmes were held during the first five months of 2001 and specifically at the Cape Technikon from 12-13 March 2002.

Some of the aspects relative to curriculum development reported in the SERTEC report (Cape Technikon 2001b), following the evaluation of the Cape Technikon, are quoted below:

(i) Self-evaluation

"Advisory committees ensure that the required quality of programmes is adhered to."

(ii) Research climate

"A research climate is lacking and needs to be further motivated and also industry related."

(iii) Purpose and outcomes of the programmes (also market relatedness)

"The revision and recurriculation of the current programmes, to service the needs of the industry, require urgent attention."

(iv) Curriculum and syllabus content

"Competent students are provided to industry. This however should be viewed with relevance to the above-mentioned requirements for recurriculation."

(v) Educational methodology

"Transformation in emphasis in the learning process from the teacher to the learner situation is commendable, but requires further implementation in the first year of study, to ensure a greater degree of interactive communication." This refers to the gradual implementation of an outcomes-based approach, whereby greater use is being made of individual and class projects, continuous assessment and an emphasis on student learning.

(vi) Experiential learning

"The value of experiential learning and availability of resources to achieve these aims cannot be overemphasised. Reciprocity with international institutions is strongly recommended."

(vii) Evaluation of programme success

"This aspect is considered to be satisfactory for the present circumstances. It is however recommended that the comprehensive list of reported strengths and weaknesses of the programme be addressed accordingly."

(viii) Role of present and former students

"The role of present students has improved significantly but further representation is recommended. An increased involvement of former students in the curriculum process is however suggested."

The excerpts quoted above are a broad reflection of several aspects that concern curriculum development in the horticultural programmes at the Cape Technikon. Their listing above should provide the reader with an impression of the position in the Department of Horticultural Sciences relative to curriculum development and related matters.

A further indication of the problems and challenges facing the Department is indicated in the attached Appendix 1.2 (Cape Technikon 2000c, Quality Assurance Panel Report, 11 September). This report was prepared by the Quality Assurance Panel for the Horticultural programmes at the Cape Technikon, which met on the given date to undertake a critical self-evaluation of these programmes (according to SERTEC requirements). This panel comprised members from industry, past students, staff and an independent facilitator. As was done above, the following excerpts from this document are listed without comment as these are self-explanatory and are aimed at further enlightening the reader. Emphasis has again been placed on issues of curriculum development.

- In the latest curriculum revision, a large degree of overlap between programmes was incorporated into the curriculum.
- A general review of programmes might be indicated in view of the industry swing to a preference for a more generic qualification.
- The field of study covered a great diversity in industry, which gave scope to graduates in the employment market.
- There is a growing demand for exit points prior to Diploma level, but the problem is whether students at these levels would be work-ready.
- Industry input towards shaping the curriculum is difficult on account of the diversity in this field.
- More advanced management and communication skills should be incorporated into the early stages of programmes, bearing in mind that graduates are able to rise to supervisory level within one year.

- The cluster of three Diploma programmes is regarded as the base for specialisation at Degree level.
- Diploma level studies do not provide adequately for management skills.
- Industry-related competencies, e.g. drafting of a bill of quantities should be highlighted more.
- Entrepreneurial bias to the programmes is considered essential.
- BTech perceived as lacking scope: no prospect of promotion or extra income in industry.
- More attention to financial (management) aspects seem to be indicated by the employment market.

Appendix 1.2 also makes reference to the previous SERTEC evaluation in 1997 and the following extracts are quoted, indicating a recurring request for curriculum revision:

Shortcomings	**Remedies**
- Trade and industry are looking for a more generic product	Curriculum redesign strongly and urgently indicated
- Cut flower industry not reflected in programmes	Curriculum redesign
- Not sufficiently practice-oriented	Curriculum redesign in light of industry demand and SAQA requirements
- Programmes lack offering(s) in communication skills	Curriculum redesign.

The above SERTEC evaluation concludes with the following statement (Appendix 1.2, page 6): "This cluster of programmes seems to reflect the diversity of industry, but the current trend is towards a more generic qualification. Curriculum redesign is necessary to be able to meet the needs of trade and industry, while making adequate provision for the historically disadvantaged students' entry into this field of study." Even a cursory study of the above indicates that curriculum revision is urgently required.

The foregoing paragraphs have attempted to provide a contextual analysis and motivation for the researcher's identification of problems in the revision of curricula of horticultural

programmes at technikons. The problem statement relative to this research study is provided in the following paragraph.

1.3 PROBLEM STATEMENT

The context within which this study took place was one which was subject to continual change. It is a national context and at present is still one which is being changed and adapted as SAQA and its structures deliberate and lay down statutory policy regulations. To a large extent, SAQA and on technikon level, the CTM's Committee on Curriculum Development, are developing procedural arrangements for the development of curricula and the writing of outcomes as the process unfolds (Genis 1999: 1).

Curriculum development on technikon level is co-ordinated by the convenor technikon and in the past has taken place through inter-technikon meetings at which members of the industry were usually invited to participate. The advisory committee meetings referred to above fulfilled the latter role. The current position is less than satisfactory as no formal situational analysis takes place; neither are research procedures followed in determining training needs.

The problem that will be investigated relates specifically to the context within which horticultural curriculum revision takes place at technikons. It is the researcher's contention that curriculum revision in these programmes in the past has been flawed, or at best has been deficient because revision has not incorporated a situational analysis as part of curriculum revision. The researcher's thesis, as described in the foregoing paragraphs, is that a scientifically validated curriculum for tertiary-level horticultural training is essential and a prerequisite for the development of a trained and qualified professional body of horticulturists in South Africa. Furthermore, until a situational (or needs) assessment has been undertaken and the required competencies within the different sectors of the horticultural industry have been identified, it is not going to be possible to write a curriculum that

(a) Is representative of the present and future needs of the industry and
(b) consists of outcomes-based skills/competencies (and that will enable SAQA to register standards and qualifications on the Higher Education band of the NQF).

1.4 AIMS OF THE STUDY

The **primary** aim of this study is the undertaking of a situational analysis as the first phase of curriculum design. The results of this analysis will be utilised in the development of a theoretical curriculum framework that may be used in the development of a revised curriculum for technikon horticultural training, which meets the needs of the different sectors of the industry and which is structured in a format compatible with the NQF.

The **secondary** aims of the study are:

- The identification of the primary, present and anticipated future competencies or outcomes (exit level outcomes and specified outcomes) of tertiary qualifications in horticulture at technikons (specifically including the identification of managerial competencies);
- The identification of the degree to which horticulturists have prepared themselves for their careers;
- The identification of the optimum training opportunities or platform for the instilling of critical cross-field outcomes (or life skills);
- The identification of the most important attributes or qualities employers expect of a qualified horticulturist;
- The identification of important values applicable to the horticultural profession;
- The identification of criteria what could be used in selecting candidates for a programme in horticulture;
- The identification of the changes that have taken place in the industry in the last 10 years and those that are anticipated for the next five years; and
- The identification of the most important problems and challenges currently being experienced in the seven sectors of the horticultural industry.

1.5 SUMMARY

This chapter has attempted to provide a synopsis of the current position in curriculum development in horticultural education and training at technikons in South Africa. An historical overview of the development of the National Diploma programmes in Horticulture, Landscape Technology and Open Space and Recreation Management has been provided, including a summary of the various curricula revisions which were

implemented in 1979, 1991 and 1996. Reference was made to serious shortcomings in these revisions, with specific reference to the applicable legislation and directives of the Department of Education. The purpose and functions of advisory/industrial liaison committees in technikon curriculum development were discussed, with specific reference to programmes in Horticulture. Reference was made to the limitation of their powers to an advisory role. The lack of empirical research in undertaking curriculum development was discussed.

The effects of the South African Qualifications Authority Act (No. 58 of 1995) and the National Qualifications Framework upon education and training in general as well as those specific to the horticultural industry were subsequently discussed. One of the primary effects were that qualifications and standards registered on the NQF were to be described in terms of learning outcomes that qualifying learners were expected to demonstrate. A comparison was made between the past emphasis on the "qualification-as-destination" approach and the envisaged "learning-for-life" approach. The profile of the kind of learner who will be a "flexible generalist", one who will be equipped to deal with the demands of the 21st Century was discussed, a vision which emanates from the NQF's *raison d' être.* The structure of the NQF and its primary functions were briefly described.

The opportunity of renewed curriculum planning using SAQA's outcomes-based format was presented. The focus of this research is on the first stage of the curriculum design process, i.e. situational (or needs) analysis and this was explained. The procedure that was followed in submitting technikon qualifications for interim registration and the procedure that is currently being followed in submitting interimly registered qualifications for full registration was explained. The curriculum development procedure applicable to technikons was highlighted, together with an historical overview of the technikon policies of national programmes and convenor technikons. This was followed by a discussion of the effects of outcomes-based education and training on the sub-field of Horticulture.

The SAQA Status Report of 18 March 2002 listed the SGB for Ornamental Horticulture and Landscaping (SGB OHL) as being a registered Standards Generating Body, with Identification Number 1229 (SAQA 2002: 1). The process followed in identifying the sectors of the horticultural industry for which this SGB was to be responsible, as well as the identification of the seven sectors upon which this research is based, was described. The horticultural industry in South Africa is divided into sectors according to various

professional and market factors and the division selected closely reflects an Australian model, which was tested amongst local members of the industry. The following categorisation of industry sectors was decided upon:

Amenity horticulture
Arboriculture
Floriculture
Landscape
Nursery production
Nursery retail
Turf

The outcomes of the Cape Technikon's and SERTEC's quality assurance evaluation meetings of the last few years were described, specifically as these related to curriculum development. Much of these were quoted verbatim and provide the reader with an unbiased overview of the outcome of the evaluation exercises. The recurring theme is encapsulated in the following statement: "... (T)he current trend is towards a more generic qualification. Curriculum redesign is necessary to be able to meet the needs of trade and industry, while making adequate provision for the historically disadvantaged students' entry into this field of study" (see Appendix 1.2).

This chapter has attempted to provide a contextual analysis of curriculum development in horticultural programmes at technikons, particularly in the light of the NQF and outcomes-based education and training. The need expressed by both SERTEC and the individual technikons' advisory committees for horticulture that the current programmes in horticulture be revised is a unanimous one (Cape Technikon 2001b). The lack of substantive research in addressing curriculum development is a serious oversight and it is at this time that SAQA's stipulations relative to the OBE revision of all qualifications are being implemented, that the current position presents one with the opportunity to recurriculate using a scientific methodology. This study aims to rectify this situation and present an integrated framework for a revision of horticultural qualifications, which industry and the educational sectors will be asked to evaluate and consider for implementation.

The following chapter will address various related theoretical aspects of curriculum development. Emphasis will be placed on how these relate to the field of horticulture.

Definitions of curriculum and curriculum development will be followed by a discussion of various approaches to curriculum development. The focus of this study on the curriculum design phase of curriculum development will be explained. The undertaking of a situational analysis (or needs assessment) as the first step in curriculum design is motivated. Outcomes-based education and training will be discussed, in particular the NQF and the advantages and disadvantages of the SAQA structures and processes as these relate to curriculum development.

CHAPTER TWO

VARIOUS RELATED THEORETICAL ASPECTS OF CURRICULUM DEVELOPMENT

2.1 INTRODUCTION

Following upon the identification of particular problems in the revision of curricula in horticultural programmes described in the previous chapter, this chapter will describe various related theoretical aspects of curriculum development. Emphasis will be placed on the relation these have to horticultural curricula. The terms curriculum and curriculum development will firstly be defined. Curriculum development as a four-phase process that includes design, dissemination, implementation and evaluation will be presented. The principles of curriculum development will be briefly listed. The focus of this research on one of the sub-phases of curriculum design, i.e. situational analysis, will be described and the process of undertaking a situational analysis presented, together with an analysis of the possible information sources. Various approaches to curriculum development will be discussed. Three dichotomies will be presented as contrasting approaches to curriculum development. These are a content vs a process approach, a deep vs a shallow approach and an individualistic vs a directed approach. Outcomes-based education and training as it is being applied in South Africa will be briefly explored.

2.2 CURRICULUM DEFINED

The following paragraphs aim to stress the importance of curriculum, to define the term curriculum and to explain its contextual meaning as used in teaching and learning.

Pratt (1994: 5) emphasizes the importance of a curriculum by stating that a full-time school career of 12 years is an investment of 12 000 hours. While the school career is fundamental to the development of any learner, post-secondary learning that could continue throughout an individual's working life, may be regarded as exponentially more important. It is upon this that the individual's livelihood will be based. The development also of specific professions is dependent upon the expertise and commitment to vocational learning of all those who find employment within those disciplines. Questions that are

relevant are: What is being learned and what is being taught? How relevant is the curriculum and how can it be improved?

In defining curriculum, Pratt (1994: 5) states that Cicero applied the term curriculum metaphorically when he spoke of *vitae curriculum* ("the course of one's life") and that the original derivation of the word *curriculum* is from the Latin verb *currere* ("to run"). *Curriculum* came to mean a "racing chariot" or "race track". It may be seen today as an educational "track".

Oliva (1997: 4) states that the word *curriculum* has given rise over the years to many interpretations, often depending upon the philosophical beliefs of the writers. He lists the following as examples:

- Curriculum is that which is taught in school.
- Curriculum is a set of subjects.
- Curriculum is content.
- Curriculum is a program of studies.
- Curriculum is a set of materials.
- Curriculum is a sequence of courses.
- Curriculum is a set of performance objectives.
- Curriculum is a course of study.
- Curriculum is everything that goes on within the school, including extra-class activities, guidance and interpersonal relationships.
- Curriculum is that which is taught both inside and outside of school directed by the school.
- Curriculum is everything that is planned by school personnel.
- Curriculum is a series of experiences undergone by learners in school.
- Curriculum is that which an individual learner experiences as a result of schooling.

Oliva (1997: 4) contends that from the above definitions, one can view the curriculum in a narrow way (as subjects taught) or in a broad way (as all the experiences of learners, both in school and out, directed by the school). He states that the school that accepts the narrow context as opposed to the school that accepts the broader context takes upon itself

a far simpler task than a school that takes upon itself responsibilities for experiences of the learner both inside and outside of school.

While, according to Oliva (1997: 2), the word *curriculum* has taken on an elusive, almost esoteric connotation (and is therefore difficult to define), it is generally regarded as the means by which learners can be seen as moving on an educational track, under the leadership of their mentors, to a higher level of knowing. The latter may be to adulthood or it may be to a deeper preparation for a vocational career.

Pratt (1994: 5) states that his textbook *Curriculum planning: A handbook for professionals* would relate curriculum to mean "... a plan for a sustained process of teaching and learning". Oliva (1997: 18) states similarly that his text in *Developing the curriculum* follows the concept of curriculum "... as a plan or program for the learning experiences that the learner encounters under the direction of the school". In one of the few recent books written in South Africa on curriculum development, Carl (1995: 31) quotes several other authors (Stenhouse 1976: 1-5; Marks, Stoops & King-Stoops 1978: 457; Tunmer 1981a: 1; Tunmer 1981b: 30; Tanner and Tanner 1975: 48-49) who in the past 36 years have referred to curriculum as a "plan". This *plan* variably includes clear aims, means of achievement, guidance and learning experiences. Pratt (1994: v) states that the term "planning" encompasses the intentions of instruction, instructional content and strategies, identification of learning resources, implementation of curriculum, assessment of student progress and programme evaluation. All of these processes are equally important and their planning should be well co-ordinated so that the curriculum attains its goals. The same author (Pratt 1994: 5) likens a curriculum to the set of blueprints from which a house is constructed or, alternatively stated, it is "... a blueprint for instruction". Oliva (1997: 3-4) explains that a curriculum is "... built, planned, designed and constructed ... improved, revised and evaluated". He likens it to photographic film that must be developed. It must also be "... organised, structured, restructured and reformed".

Despite the many definitions of curriculum in terms of a plan, a blueprint or a scheme, reference should also be made to the dynamic nature of curriculum. It should also be recognised that one is dealing with a societal phenomenon that is dynamic, is subject to continuous change and is inextricably linked to its socio-cultural setting. This is elucidated below.

Cornbleth (1990: 6) states that curriculum is contextually shaped and that curriculum cannot be either understood or changed without attention to its setting or context. This author states that context is both structural and sociocultural. In the former, curriculum must be seen as occurring within established roles, relationships, shared beliefs and norms. In the latter, curriculum occurs within demographic, social, political and economic conditions, traditions and ideologies. Grundy (1987: 115) states that "curriculum as praxis" is a social process and as much more than a set of plans to be implemented, is constituted through an active process of action and reflection. Cornbleth (1990: 7) continues this argument stating that curriculum emerges from "... the dynamic interaction of action, reflection, and setting, not action and reflection alone".

In this study, the curriculum will be regarded as an interactive and dynamic curricular programme for the development of learners in the vocational field of horticulture. To refer to curriculum as a blueprint is to give it rigid or fixed attributes, while to refer to curriculum as an interactive and dynamic programme is to give it the characteristic of being open to change and adaptation. The envisaged curriculum for horticulture will be constructed so that it meets the needs of all its stakeholders. These needs are those of the industry as it presently finds itself, but also those needs of the industry as it continually adapts to new technologies. This curriculum should therefore be continually constructed by scholars and practitioners in a social process in which the desired norms and values and skills and competencies are identified, adopted and structured into a learning programme which will serve the educational and training needs of the industry.

A curriculum for horticulture, to use a metaphor from the discipline, must be allowed to grow as the discipline develops amidst expanding technology, pruned to encourage new ideas and methods and nurtured in a context of its own so that it is always relevant.

The following paragraph will define curriculum development and will thereafter identify the focus of this study, i.e. situational analysis, as the first phase of curriculum design. Various approaches to curriculum development will be presented. This researcher's approach as lying between experiential and technological will be explained. Three dichotomies will be presented as contrasting approaches to curriculum development. These are a content vs a process approach, a deep vs a shallow approach and an individualistic vs a directed approach to curriculum development. The location of horticultural curricula on these three

continuums will be identified as the following: a process approach, a deep learning approach and a directed curriculum approach.

2.3 APPROACHES TO CURRICULUM DEVELOPMENT

The term *curriculum* was defined in the foregoing paragraphs and in the next paragraph *curriculum development* will be defined. This will be followed by a discussion firstly of 10 curriculum development principles. The location of this research within one of the phases in the process of curriculum development will be identified. The curriculum design phase will be described, with specific reference to its sub-phase, situational analysis. Various approaches to curriculum development will be presented in the concluding paragraphs under this heading.

2.3.1 Curriculum development defined

Oliva (1997: 23) refers to the purpose of curriculum as analogous to providing a vehicle for ordering and directing learning experiences and to curriculum development as the process of maintaining the vehicle and keeping it running smoothly. This author states that curriculum development includes planning, implementation and evaluation and adds that the curriculum developer's function is to continuously find newer, better and more efficient means of educating the young (Oliva 1997: 24).

Carl (1995: 47) regards curriculum development as "... an umbrella and ongoing process in which orderliness and systematic planning figure strongly from design to evaluation". Different authors identify various phases of this process. Mostert (1986: 8-9, in Carl 1995: 47) identified six authoritative phases in which the progression of the curriculum development process is indicated. These are listed below together with the corresponding actions:

Global review of curriculum development phases

	Phases	**Actions**
1.	Initiation	- Launching of an introductory investigation
2.	Planning	- Situational analysis
		- Formulation of goals

		- Determination of criteria for the selection and classification
		- Planning of an experimental design
3.	Development	- Selection and classification of learning content and refinement of goals
		- Supplying didactic guidelines
		- Production of teaching material
		- Development of teaching material
		- Development of evaluation mechanisms
		- Submission to experts for evaluation
4.	Testing	- Teacher preparation for the instructional task
		- Instruction
		- Formative evaluation
		- Review
5.	Implementation	- Planning of learning contents
		- Dissemination
		- Teacher orientation
		- Instruction
6.	Summative evaluation	- Final evaluation of the programme

Carl (1995: 48) simplifies the above progression of the curriculum development process by categorising curriculum development into four phases as indicated in Figure 2.1. The arrows indicate that the four phases may operate in any sequence, that they should be seen as interactive and that a feedback cycle should be activated after any work has been done in any of the phases (Carl 1995: 47-49).

Each of these phases is discussed below:

i) Curriculum design. In this phase a new curriculum is planned and/or an existing curriculum is reviewed and re-planned. This should be preceded by a full re-evaluation.

ii) Curriculum dissemination. The curriculum dissemination or implementation phase in curriculum development is the phase where curriculum consumers are informed and prepared for the proposed curriculum.

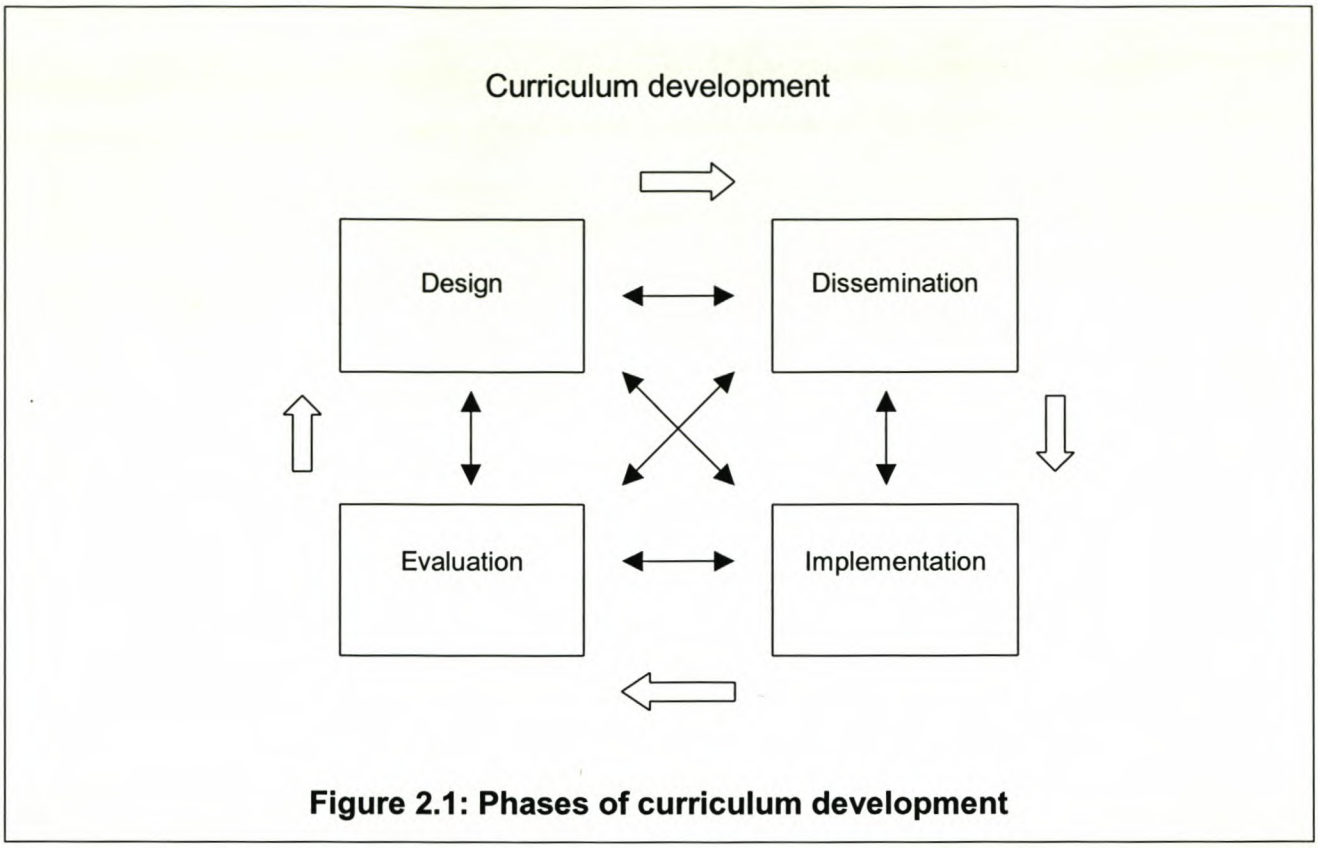

Figure 2.1: Phases of curriculum development

(Carl 1995: 48)

iii) Curriculum implementation. During this phase the relevant design is implemented or put into practice.

iv) Curriculum evaluation. During this phase curriculum-oriented as well as learner-oriented evaluation is done whereby the success and the effectiveness of the curriculum is evaluated.

Carl (2000: 30) states that the modernist RDDA (indicating curriculum research, curriculum design, curriculum dissemination, curriculum implementation/adoption and also, curriculum evaluation) approach includes curriculum research in the curriculum phase. Included within the curriculum research phase are the following activities:

- Situational analysis/needs analysis
- Broad overarching general aims; critical outcomes
- Specific module, learning and teaching objectives; specific outcomes
- Core contents

- Selection and organisation of learning content
- Selection and organisation of learning experiences/learner activities
- Methods, techniques, media
- Evaluation/assessment to determine learning gains and learner development.

The importance of undertaking a research study into the curriculum needs of the horticultural industry has been discussed in Chapter 1. One of the reasons stated was that an analysis of this nature has never yet been undertaken in South Africa and curriculum revisions have, to a large extent in the past, been based upon inter-technikon discussions. This research study will undertake a situational analysis as the first phase of a revision of the existing curriculum in horticulture. The situational analysis will endeavour to inform the activities referred to above. The emphasis however, will lie squarely on identifying the skills/competencies/outcomes that are required of a horticulturist operating in any one of the seven identified sectors.

The objectives of a technikon education are listed below prior to the ensuing discussions on the principles of curriculum development, curriculum design and the approaches to curriculum development.

2.3.2 Objectives of technikon education

It is hoped that the fundamental characteristics of a technikon education will be highlighted by the following discussion. Reference is made to extracts from three documents that capture the *raison d' êtr*e of technikon qualifications.

The objectives of a technikon education, as set out by the Department of Education (1997: 3-4) are defined as follows:

a) Technikons must support and guide students at the tertiary level towards greater maturity.
b) Technikons must prepare people for a particular occupation or industry and are oriented towards the practice, promotion and transfer of technology.

The mission statement of the Cape Technikon is quoted below as a specific example of how one technikon has encapsulated these objectives into its own mission statement:

> "The Cape Technikon, an accessible centre of excellence in higher education, provides and facilitates high-level career and technology education and training in partnership with all its stakeholders. Its aim is to encourage the development of individual creativity, the acquisition of skills and the expansion of knowledge for national, regional and personal growth."
> (Cape Technikon 2001: 3).

The SAQA (2000: 4) policy document *Criteria for the generation and evaluation of qualifications and standards within the National Qualifications Framework* states that evaluators of qualifications should establish the following in evaluating a qualification:

- whether the qualification is likely to issue in the kind of transformation for which the NQF stands, and which the critical cross-field outcomes attempt to address - especially the issues of responsible citizenship, cultural and aesthetic sensitivity, and effective use of science and technology; and

- whether the qualification not only prepares learners for a particular job but facilitates entry to a career path which opens up opportunities for lifelong learning.

This document (SAQA 2000: 4) states that: "The overarching question is this: **Will the achievement of this qualification contribute towards the full personal development of the learner and to the social and economic development of the nation at large?"**

It is in particular the last statement which emphasises the responsibility technikons have in preparing their learners for a career, which utilises science and technology and that will lead to the full personal development of the learner and to the growth of the country. The objectives of a technikon education listed above, are followed in the ensuing paragraphs, by discussions on the principles of curriculum development and related issues of curriculum development.

The principles of curriculum development will be described in the paragraph below.

2.3.3 Principles of curriculum development

Oliva (1997: 25) states that the identification of guiding principles in curriculum development is useful as they serve to guide the activities of all persons working in a particular area. This author lists 10 principles or guidelines of good curriculum development, some of which he states, are based upon science and technology and others are based upon folklore of curriculum, observation and good common sense. These are briefly listed below:

1. Change is both inevitable and necessary, for it is through change that life forms grow and develop.
2. A school curriculum not only reflects but is also a product of its time.
3. Curriculum changes made at an earlier period of time can exist concurrently with newer curriculum changes at a later period of time.
4. Curriculum change results from changes in people.
5. Curriculum change is effected as a result of cooperative endeavour on the part of groups.
6. Curriculum development is basically a decision-making process.
7. Curriculum development is a never-ending process.
8. Curriculum development is a comprehensive process.
9. Systematic curriculum development is more effective than trial and error.
10. The curriculum planner starts from where the curriculum is, just as the teacher starts from where the students are.

Oliva (1997: 40) recommends that the curriculum workers follow these generally accepted principles as they should facilitate a co-ordinated stance between curriculum workers and ensure that changes to curricula do not occur willy-nilly and that curriculum changes correspond to changes in the societal environment. Curriculum workers should not forget that their context is not only the classroom or the specific institution, but also society at large. It is to this context that Oliva (1997: 28-40) addresses his principles. He states that they are aimed at the resolution of the following societal criteria relative to change: they are inevitable, continuous, concurrent, comprehensive; they are products of their time, existing as people change. He states that a particular decision-making process is usually used and that development is normally systematic and that this starts from the existing.

2.3.3.1 Principles of curriculum development in this research

This researcher has taken special note of the principles of curriculum development identified above and has attempted to ensure that full cognisance has been taken of these in this study. The inclusion of a question to all of the focus group interviewees that specifically related to changes in the horticultural industry was aimed at determining the extent and range of current and future changes. Respondents were asked to indicate the changes that they may have experienced during the past 10 years and also that which they expected to see occur in the next five years. While change is inevitable and continuous, as spelt out in the above principles, the persons best able to identify areas of likely change are those directly involved in the industry.

The following paragraph will describe the curriculum design phase, which incorporates the process of situational analysis.

2.3.4 Curriculum design

The application of curriculum development models as a means of describing the process of curriculum development will firstly be presented. Carl's identification of contextual evaluation, which includes situational analysis as the hub of the curriculum development process, is discussed. Both the nature of the curriculum design process and the different levels of curriculum development are discussed. Criteria that guide the curriculum design and by which the design is held accountable are also listed. The process of undertaking a situational analysis will also be presented together with an analysis of the possible information sources.

Oliva (1997: 158) states that curriculum leaders should take note of the different curriculum development models, that they should be tested and one either selected or adapted to suit the particular situation. He states that this is important in ensuring that curriculum development is methodical and purposeful.

In evaluating a range of models presented by different authors over some 20 years, Carl (1995: 94) identifies the following factors as common amongst most of the curriculum models discussed:

- Situational analysis/Contextual evaluation/Initial evaluation
- Objectives and goals
- Selection and classification of contents
- Selection of methods, techniques and media
- Selection and classification of learning experiences
- Planning and implementation of the instructional learning situation
- Evaluation of pupils.

Carl (1995: 94) states that when one studies the different curriculum models, it becomes clear that they are either not comprehensive or not discriminatory, or cannot be utilised at all levels or cannot be applied to all educational systems and communities. Carl (1995: 95) presents a model that is detailed, may be utilised at any curriculum level and represents a dynamic interaction of the various components (as opposed to a fixed progress pattern). This model places "contextual evaluation" as the hub upon which all other components revolve. Carl (1995: 96) states that contextual evaluation includes situational analysis and that contextual evaluation has been centrally placed to indicate its dynamic interaction with each of the other components where it fulfils an essential coordination and evaluative function. The focus of this research is on a situational analysis of the horticultural industry. It therefore focuses on one of the components of the curriculum design process, i.e. situational analysis.

While the different models of curriculum development all attempt to identify firstly the distinct stages in the process and secondly their interactive relationship, Carl (1995: 82) warns that curriculum design is not a "fixed recipe consisting of components and fixed rules, but a process characterised by flexibility and pliability within which the specific variables exercise a strong influence". Pratt (1994: 45) for example, reminds that one should be mindful not to separate curriculum development from curriculum implementation. He recommends that it is more logical to think in terms of "developing implementable curricula" and this certainly is the point of departure in this study.

Carl (1995: 82) also points out that curriculum design may take place at a variety of levels. Using his description of three levels as macro (national level), meso (provincial or departmental level) and micro (school or institutional level), this study could be seen as macro indicating the national context, meso indicating the sector-specific context and micro indicating the regional or local level. As described in Paragraph 1.2.1.2, horticultural

courses offered at technikons in South Africa are typically national because of the system of convenor technikons and the coordination of both the Department of Education and the Committee of Technikon Principals. The seven sectors in the industry occur on a national level (or meso level) because of the overlap between the sectors. Regional or local variations do occur largely as a result of climatic, geographic and economic reasons and these can be considered to occur on the micro level. This study will concentrate on curriculum design at the national level because of the national character of the horticultural industry in the country. It may well be contested that this is a direct result of the national character of technikon education and that this has obviated the development of regional curricula, which may have arisen had there instead been regional coordination of curriculum development.

In stressing the importance of curriculum development, Mostert (1985: 40) states that planned and responsible curriculum development should be founded on a comprehensive situational analysis. This author states furthermore that the curriculum development process must be seen as cyclical. According to Oliva (1997: 226), a situational analysis should be completed on at least a five-year cycle (with minor or annual updating).

As the phase of curriculum design is one of recurrent decision-making aimed at continual improvement of existing curricula, Carl (1995: 88) states that it is important to set criteria that may lead to curricula that are relevant and accountable. The following criteria are proposed:

- The inter-disciplinary nature of curriculum design must be acknowledged.
- There must be a child-directedness that takes the child's level of development into account.
- Planning must be purposeful.
- Method must be an important characteristic of the design.
- There must be relevance in regard to practice orientation and needs.
- Comprehensiveness must be a characteristic of the design.
- Didactic demands must be taken into account.
- The demands of subject sciences must be taken into account.
- Note must be taken of educational administrative demands.
- The demands and needs of the broad community must be considered.
- Effective evaluation is an inseparable part of curriculum design.

- There should be a balance in regard to the attention received by the cognitive, affective and psychomotor domains with a view to contributing to the general education of the child.

The usefulness of taking into account the above criteria prior to undertaking curriculum development is that the curriculation deliberations are both guided by the listed criteria and are held accountable by them. The inter-disciplinary nature of the horticultural profession is one of its most profound characteristics as it relies heavily on the sciences of several ancillary fields. The demands and needs of all of the identified sectors of the industry should be accommodated in the curriculum design. While certain of the criteria listed above refer specifically to the child, these criteria certainly relate to learners of all ages.

In the following paragraph, which relates to situational analysis as a sub-phase of curriculum design, the terms *situational analysis*, *needs assessment* and *design* will be compared, followed by an analysis of the information sources for a situational analysis.

2.3.4.1 Situational analysis

Mostert (1985: 24-38) compares the use various authors have made of the terms *situational analysis*, *needs assessment* and *diagnosis* in their curriculum development models. The question that is posed is whether these terms are synonyms and whether they have the same meaning in curriculum nomenclature. The argument as to which of these is preferable, depends upon each author's definition and application of the selected terms. Mostert (1985: 40-41) recommends the use of the term *situation(al) analysis*, stating that *needs assessment* is not used as widely as *situational analysis* and while it does address the "needs" of the learners, of the profession and of society, a *situational analysis* by implication includes these. It also includes a study of all aspects relating to the existing curriculum and its implementation. *Situational analysis* has a far more comprehensive meaning than *diagnosis* as a *situational analysis* encompasses a diagnosis of the issues at stake.

In a *situational analysis*, an analysis is made of both the existing and the envisaged situations; i.e. whereby the demands of society, the subject/course content and the learner are analysed (Mostert 1985: 33). These aspects relative to the curriculum should not only be analysed, synthesised and evaluated (in essence a diagnosis), but the *needs* of each of

these elements should be ascertained and recommendations made based upon the findings. Saylor, Alexander and Lewis (1981: 189, quoted in Mostert 1985: 28) state that a "... need exists when there is a discrepancy between a desired or acceptable state of affairs and an observed state of affairs". Carl (1995: 98) states that at national level (as in this study), the identification of specific needs would be able to lead to the development of a broad curriculum.

Mostert (1985: 30 - translated) defines *situational analysis* as:

- An overview of the terrain
- An analysis of the total of all the determinants of both the present as well as the planned situation and the commensurate objectives
- An analysis of the following questions:

  What? - syllabi content

  To whom, when? - learner

  Why? - objectives emanating from the demands of the community, the learner and the syllabus.

The essential elements of a *situational analysis* having been identified, the information sources for a *situational analysis* as well as the means that may be used to access them will be dealt with in the subsequent paragraphs.

2.3.4.1.1 Information sources for a situational analysis and means to access them

Pratt (1994: 38-46) refers to four main information sources. These are opinion surveys, task analyses, social indications and test and research data. These are briefly discussed below.

(i) Opinion surveys

Pratt (1994: 39-46) refers to three groups of respondents, viz. specialists, clients and gatekeepers.

Specialists in particular disciplines are an invaluable source of information because of their expert knowledge and experience. Pratt (1994: 39-40) states that of all groups, specialists

will most likely have a sense of the future developments in the field. It would be important to include specialists from both the private sector and the government sector, as well as academics responsible for teaching existing curricula. In the first stage of this study, various specialists within the seven identified sectors in horticulture were approached for a personal interview. The 25 interviewees selected were from a diverse background in terms of employment, education and experience.

Pratt (1994: 40-43) lists as clients: past and current students, parents, teachers, employers and the community. While this may apply more to the school situation, students, teachers (or lecturers) and employers are the most important in vocational curricula. Students are typically perceptive and incisive regarding their curriculum, teaching and assessment methods and job prospects and should certainly be consulted. Lecturers are in constant contact with their students and as administrators of vocational curricula with many years' professional experience, they are an important source of information. Employers are unquestionably one's most important clients as their businesses are dependent upon the attributes and competencies of the young graduates entering the employment sector. Pratt (1994: 43) lists the community as a major player in the curriculum development process. In this study, past and present students, lecturers and employers were considered to be the primary clients and were included in all stages of the study.

Pratt (1994: 44-47) refers to gatekeepers as individuals who have the power to affect the implementation of decisions. In a school curriculum, these could vary from members of the local legislature to newspaper editors. In this study, the primary gatekeepers could be considered to be executive committee members of the various professional institutions and industry bodies. The senior officials and/or partners of the larger employers also have a large sway in directing curriculum revision.

Pratt (1994: 46-50) lists questionnaires, telephone interviews, hearings and briefs as the primary methods of collecting information in opinion surveys. Mostert (1985: 154-153) includes personal interviews, focus group interviews and observation. This study with its triangulation approach to its methodology has utilised personal interviews, focus group interviews and self-administered mail questionnaires. Aspects of methodology are discussed in greater detail in Chapter 3.

(ii) Task analysis

Pratt (1994: 51) recommends that other methods be used to corroborate the subjective data produced by respondents in interviews, hearings or surveys. In task analysis, the important components of tasks that will become significant elements of the curriculum are identified. By a process of observation, trained observers would shadow a horticulturist for a period of time, noting what information, skills and attitudes are used on the job, what training and supervision is required, what tools are used and to what extent tasks involve interaction with data, people and things (Jonassen, Hannum & Tessmer 1989, quoted in Pratt 1994: 51). Following task identification, specialists such as workers, supervisors and trainers evaluate the tasks and rate the importance of each and add any omitted tasks. Pratt (1994: 51-52) states that task analyses are best conducted by curriculum planners themselves as part of their preparatory work.

While task analysis has not been included in this study, the researcher has relied upon his own practical experience in various sectors of horticulture to identify any discrepancies in the reported findings. Where necessary, confirmation on procedures, tasks, skills and competencies was obtained from specialists within the respective sectors. The usefulness of task analysis is that where opinion surveys may lead to an amount of subjective data, task analysis is balanced and greater objectivity is ensured.

(iii) Social indications

Pratt (1994: 54) refers to social indicators as "hard data", such as statistics on unemployment rates and income and states that these would depend upon the nature of the curriculum being designed. Public opinion and social indicators are complementary types of data, which may give warnings of inconsistencies (either in the statistics or in the subjective opinions) and could be used to corroborate or refute information.

In this study, little relevant and recent information of this order could be identified. An effort was made however in the mail questionnaire to obtain as much information as possible on in-service training programmes and the numbers of horticulturists operating in different sectors. It would however be useful in future studies to have significant and appropriate statistics identified and collected.

(iv) Tests and research data

Research data within the field of horticulture is generally not available or is not directly applicable. No research studies could be identified which address issues relative to curriculum, employment and the size and scope of the industry in general. Pratt (1994: 55) recommends that test data be disaggregated, that is statistics should be broken down into elements such as gender, ethnicity or age. It would be useful to the development of curricula in horticulture if, for example, information on second-language learners, or africanisation of horticulture were available.

Various approaches to curriculum development will be discussed in the following paragraph.

2.3.5 A number of specific approaches to curriculum development

Four broad approaches to curriculum development, as defined by one theorist, will be briefly summarised in the following paragraphs. This will be followed by a discussion of three sets of contrasting approaches to curriculum development. The discussion of each of these must be seen in the context of a technikon curriculum in horticulture. Using the dichotomy between a deep and shallow approach, the researcher will stress the technikon context that encourages problem-solving as a point of departure. Using the contrast between a content and a process approach, the researcher will stress a student focus, and the contrast between an individualistic and a directed curricula approach will be used to stress an approach that is directed at a specific vocation. The core of a technikon education, particularly of that in horticulture, is demonstrated by this context.

The identification of a particular approach to curriculum development relates to the curriculum developer's epistemological point of view and its acknowledgement assists the reader in understanding his/her point of departure. Carl (1995: 49-56) provides a synopsis of four approaches to curriculum development described by Walters (1985: 6-17). These are the academic, the experiential, the technological and the pragmatic. Each of these is discussed briefly below.

i) The academic approach is based on the application of studied logic in educational decision-making. In this approach goals and objectives are identified, followed by a

selection and classification of content, the design of methods and the evaluation of outcomes. Carl (1995: 49) states that the curriculum specialist is placed in a position where curriculum decisions can be taken unilaterally.

ii) In the experiential approach, the approach is subjective, personal, heuristic and transactional and lays stress on the co-operative role of teachers and pupils (Carl 1995: 51-52). The learner is seen as being in a condition of evolution towards a more complete person and processing skills and affective experiences form the content of the curriculum.

iii) The technological approach regards instructional planning in terms of "systems", whereby it endeavours to maximise educational effectiveness by applying the same scientific management and production principles to the instructional situation, as is applied in industry (Carl 1995: 54). Its effectiveness is controllable according to good management principles.

iv) The pragmatic approach uses elements of the above three approaches in an eclectic process in which the curriculum procedure is seen as reactive and takes place fragmentarily (Carl 1995: 56). This process is neither systematic nor rational, but is rather a "... long and dynamically complex process of involvement and interaction".

In this study, the researcher's approach varied from the experiential to the technological and was therefore somewhat eclectic. It is experiential because of the emphasis placed upon the interactive relationship between the teachers and the learners. The active involvement of the learners in the learning situation is seen as essential in obtaining maximal learning outcomes. The researcher's use of a qualitative approach in undertaking this research relates directly to the use of an experiential approach as a means to understand the depth of the meanings behind curriculum objectives. This is regarded as important in developing curricula. The technological model makes use of empirical methods and sees learning as a "system" in which learning is predictable, systematic and controllable (Carl 1995: 54). Curriculum development takes place in specific steps, viz. needs assessment, task analysis, structure analysis, synthesis and operational refinement. The importance identified by the researcher of producing empirical data by utilising a quantitative technique, i.e. a mail questionnaire, to inform the situational analysis, relates

to a technological approach to curriculum development. Issues of research methodology will be fully discussed in the following chapter.

The following approaches to curriculum development relate to the technikon orientation towards problem-solving learning that focuses on specific professions and on real-world applications. They are presented here, as it is the researcher's assertion that any recommendations for a technikon curriculum must take cognisance of the fundamental principles underlying technikon education. These will be discussed as opposing dichotomies.

2.3.5.1 Content vs process approach to curriculum development

Smith and Cooper (2000: 91) compare a content or teacher-led curriculum development approach to a process or student-led approach. In the former, the teacher decides on the course aims, objectives, content, delivery and assessment of the course. The process approach emphasises the importance of experience and learning to the student where the student is fully involved in the learning process, which becomes the focus of the course. This approach relates well to the SAQA objectives in its NQF, viz. mobility, portability, recognition of prior learning and vocational learning. If the student is to be placed at the centre of curriculum development in any vocational programme, the 8-point mission and objectives statement referred to by Smith and Cooper (2000: 92) and which was developed for the Tourism and Hospitality Management programme at Ana G. Mendez University, Carolina in Puerto Rico, could quite confidently be emulated in any profession. This statement is quoted in full because of its pointed value:

> Transmission of a complex of professional, technical, and intellectual skills and concepts through a variety of learning experiences that enables students to:
>
> - compete successfully in the job market,
> - be productive members of society,
> - develop a career path,
> - seek additional levels of education,
> - engage in life-long learning experiences,
> - contribute creatively to the area of work and the industry,
> - perform effectively in a multicultural work environment, and

- epitomize the industry standards of quality service.

This approach prepares students for their vocational choice and as indicated above in the list of objectives of technikon education, students are led to greater maturity and placed on a pathway of continuing learning. As the student is involved in the total learning experience, he or she is encouraged to develop a continuing professional development (CPD) commitment.

2.3.5.2 A deep vs a shallow approach to curriculum development

Gibbs (1995: 149) states that whether students take a surface or deep approach to learning, i.e. whether they attempt to reproduce material only or to understand it, has a "... profound effect on the quality, structure and permanence of students' learning". He warns that course design may foster either of these poles and that in developing a curriculum that encourages students to "grapple with real-life problems", student learning should be fully understood and he recommends that the curriculum be designed to encourage deep learning. It is this author's contention that if students are to achieve the goals set out in the mission and objectives statement in the paragraph above and also if SAQA's "critical cross-field outcomes" are to be successfully incorporated into all educational programmes, a deep learning approach must be sought in curriculum development, in teaching and in learning.

Gibbs (1995: 154) states that students tend to take a surface approach where they have a heavy work load, relatively high class contact-hours, an excessive amount of course material, a lack of choice over subjects and the method of study, a lack of opportunity to pursue subjects in depth and a threatening and anxiety provoking assessment system. Fox and Radloff (1997: 1) state that where students are faced with an "overstuffed curriculum" they may adopt a surface approach to learning and "... rely on tricks and short-term memory ..." to cope with assessment and an unmanageable workload. Alternatively, students will follow a deep learning approach (Gibbs 1995: 155) where they take "ownership" of the learning. This relates to the ability to exercise choice and the self-motivation which follows, where learning is active rather than passive, where there is interaction with others and where the subject matter is well structured and integrated.

Gibbs (1995: 156) states that a deep learning approach, which is in reality a problem-based learning approach, provides students with an engaging context within which learning takes place. In the declaration that both work and life consists of solving a great variety of problems, learners of all ages should be encouraged to engage in all of these with an attitude which seeks to get to the bottom of things. It is then that deeper understanding is gained and with it, the experiential ability to better direct future occurrences.

2.3.5.3 An individualistic vs a directed curriculum

Boys, Brennan, Henkel, Kirkland, Kogan and Youll (1988: 195-197) present two models of curriculum organisation, which they place on a continuum. The first of these is the individualistic curriculum, which provides students with choices within a broad menu of curriculum components so that they are able to select an individualised study programme. Teaching staff would also have great flexibility in their choice of offering, study content and materials. The premise to this approach is that scholarly choice is fundamental to education. Boys *et al.* (1988: 196) state that "curriculum development is likely, therefore, to be discipline-led, incremental, strongly influenced by student demand and staff preference and to show no consistent relationship with employment objectives".

The directed curriculum, in contrast, has a tightly organised curriculum in which students follow a programme designed to meet specific ends, in which individual choice is limited (Boys *et al.* 1988: 197). Staff members are limited in their teaching since elements offered must link in a coherent and co-ordinated way. Programmes which would use directed curricula are essentially vocationally-specific, applied, professional courses which have a pre-defined outcome and which are often strongly influenced by external professional or accreditation bodies or simply, the employment market.

2.3.5.4 Approaches to curriculum development in this study

The use of both an experiential and a technological approach to curriculum development was identified above as important. This enabled the researcher to use a qualitative approach to understanding the curriculum issues in horticulture and a quantitative approach as means of generating empirical data. Both of these approaches will be used to undertake the planned situational analysis.

The most appropriate approaches to the development of technikon curricula may be seen in the light of the contrasting debates listed above. While the study of horticulture is the study of an applied science, its practitioners also see it as an art form and a profession with numerous "hands-on" competencies. A process approach enables students to enter the employment sector with a continuous-learning or a CPD (Continuing Professional Development) approach to their careers. A deep-learning approach enables students to develop the capacity for problem-solving in a real world. This is particularly essential, with all the demands of a career that is so varied and is greatly influenced by changes in technology. A directed curriculum is essential because of the vocationally specific requirements of education and training in horticulture. Boys *et al.* (1988: 198) state that from their research into higher education and its preparation for work, it has been determined that there is a growth in multi-disciplinary, inter-disciplinary, combined and modular courses. This growth (which certainly includes horticulture) reflects a growing demand for "... technologists who can work together on problems and processes which cannot be tackled within the framework or paradigm of a single discipline".

In the following paragraphs, the outcomes-based approach to education and training (OBET) will be discussed. The process of curriculum development in OBET will be discussed as applied to South Africa and as is being suggested by SAQA and its structures.

2.4 OUTCOMES-BASED EDUCATION AND TRAINING

Following the general election of 1994, the newly elected government initiated far-reaching reform in the South African educational system. The SAQA Act (No. 58 of 1995) and the Higher Education Act (No. 101 of 1997) signaled the Department of Education's intention to restructure higher education. The Council on Higher Education Task Team's report, published in July 2000 on the reconfiguration of the Higher Education system, called for far-reaching changes to the Higher Education system (CHE 2000). Du Pré (2000: 1-2) states that the most radical demand on Higher Education Institutions (HEI's) was that academic courses be offered using a programmes and outcomes-based approach. Technikons and universities were obliged in terms of the Higher Education Act to redesign their academic courses into programme-based qualifications. While technikons have offered programme-based qualifications for many years, universities are being required to redesign their degree offerings into outcomes-based programmes. The technikon

programmes have generally been considered to be more relevant to the workplace and being more career-oriented, have provided students with more attractive prospects of employment.

The primary characteristics of an outcomes-based approach to education and training will be discussed in the following paragraphs.

2.4.1 The essence of outcomes-based education and training

The earlier or traditional approach to curriculum development followed in this country and in many others, placed the emphasis on the content of subject material and the role of the teacher in transferring knowledge to the learners. An outcomes-based approach (embodied in the SAQA Act of 1995), on the other hand, is aimed at the development of skills in the labour force and the transferability of those skills between both employers and educational providers.

A competency-based education and training approach is premised on the development of explicit, measurable standards of performance which are outcomes-based and reflect the actual units of performance in a work role (Fletcher 1997: 3). This approach has objectives, structure and defined content as does the traditional approach, but the key difference according to Fletcher (1997: 3) is the *starting point* for design. This author states that curriculum developers need to think in terms of required outputs and not desirable inputs. The standards of performance in a competence-based approach should reflect the expected products or outcomes of workplace performance (Fletcher 1997: 7).

Mayer (1992, quoted in Harris, Guthrie, Hobart & Lundberg 1995: 21) provides the following definition of the term competence:

> "The term *competence* focuses attention on learning outcomes. It is about what people can do. The Mayer Committee takes the view that competence is underpinned not only by skill but also by knowledge and understanding. It involves both the ability to perform in a given context and the capacity to transfer knowledge and skills to new tasks and situations. This means that the learner must grasp the principles and concepts which underlie particular applications, since this is the basis of transfer to new situations."

Du Pré (2000: 5-6) states that competency-based training is based on the identification and listing of the generic competencies for a specific job. This may in certain instances be directed by a guide or manual that provides guidelines for self-paced learning. Outcomes-based learning on the other hand is learner driven and aimed at achieving outcomes. Teachers in this form of learning are facilitators who stimulate creativity, self-learning and critical thinking, particularly in real-life situations and applied to the real world.

SAQA (1998b: 3-4) define outcomes as "... contextually demonstrated end-products of the learning process" and applied competence as "... the ability to put into practice in the relevant context the learning outcomes acquired in obtaining a qualification".

In defining the characteristics of competency-based programmes, Harris *et al.* (1995: 24-25) state that competence is best viewed holistically. This view would see competence as the overall capability of an individual and this competence "... arises from the development and possession of a list of relevant attributes such as knowledge, abilities, skills and attitudes" (Gonczi, Hager & Oliver 1990, quoted in Harris *et al.* 1995: 25).

The Collins Compact English Dictionary (1998: 777) defines *skill* as "special ability or expertise enabling one to perform an activity very well" or "something such as a trade requiring special training or expertise". Grundy (1987: 61-62) defines the term *skill* or *techne* as action that accords with an established rule or traditional way of working and is a form of action as practised by an artisan. This "artisanship" (or craftsmanship) refers to a practised ability as when work is of a technical nature. Grundy (1997: 176) states that when judgment predominates the undertaking of work, this relates to professionalism and a level of competency that is in a sense of a higher order than that of *techne.*

A standard of achievement or competency (i.e. SAQA's "unit standard") comprise the building blocks, which may be of differing size, depending upon the nature and scope of the competence covered by the particular unit. SAQA (1998b: 4) refers to the latter as exit-level outcomes when they refer to the outcomes a learner achieves at the point he or she leaves the programme leading to a qualification. Specific outcomes refer to contextually demonstrated knowledge, skills and values that support one or more critical outcomes.

The terms *competencies*, *outcomes* and *skills* will be used synonymously in the application of the three research techniques used in this study. In all questions posed to interviewees and respondents relative to competencies and outcomes, these will be prefixed with the word *skills.* This practice will be followed despite the fact that the word *skills* in outcomes-based terminology is considered to be one of the attributes which make up competencies (as explained above). The depth of meaning of both the words *competencies* and *outcomes* in this context is not generally understood by the public at large and adding the word skills as prefix serves to define them, be it in broad terms. (This statement is made by the researcher following informal deliberations with industry members at the meeting referred to in Appendix 1.1.)

In the following paragraphs some of the general advantages of an outcomes-based education and training approach in South Africa will be discussed together with some of the criticisms.

2.4.2 Advantages and criticisms of OBET in South Africa

The advantages and disadvantages of an outcomes-based education and training system in South Africa will not be discussed at great length here because of the extent of the debate that is taking place both nationally and internationally. The evaluation of this debate is beyond the parameters of this study. The facts are that Government has committed itself to a restructured education and training system which is based on skills development using OBET at all levels of education and vocational training. In proclaiming its new educational policies, Government has marketed the advantages of the NQF, SAQA and all its structures.

The following paragraph refers to the general advantages of OBET in South Africa as expressed in the characteristics and functions of the NQF.

2.4.2.1 The essential characteristics of the NQF

SAQA (1995: 1201-1203) list the following as objectives of the NQF, which are aimed at the restructuring of education and training in South Africa.

These objectives are to:

(a) create an integrated national framework for learning achievements;
(b) facilitate access to, and mobility and progression within education, training and career paths;
(c) enhance the quality of education and training; and
(d) accelerate the redress of past unfair discrimination in education, training and employment opportunities, and thereby
(e) contribute to the full personal development of each learner and to the social and economic development of the nation at large.

Du Pré (2000: 11-13) lists seven functions of the NQF:

(a) To see that education and training be brought together. In the past education was seen as an area where knowledge is gained and training as an area where skills are obtained. The NQF will join these areas. This will enable learners to move from one place of learning to another;
(b) Learning is recognized whether it takes place in formal or informal settings;
(c) Learners are able to move between the education and working environments;
(d) Areas of learning are connected to each other to enable learners to build on what they learn as they move from one learning situation to another;
(e) Credits and qualifications are easily transferable from one learning situation to another;
(f) Needs of the learner and the nation (which incorporates industry) are addressed and met; and
(g) Qualifications obtained by learners are recognised and accepted nationally and internationally.

The five characteristics and seven functions listed above represent 12 substantial reasons (advantages) for the institution of the NQF. The horticultural industry with its broad range of sectors (seven identified in this study) and its large workforce will undoubtedly benefit greatly from the Government's restructured educational system. The greatest value for the majority of the workforce who are currently semi-skilled and who have a minimum of schooling is that they will be able to look forward to accelerated progression in their

careers. The reasons are that they can expect to undergo training and to receive recognition for their current competencies.

The following paragraph refers to some of the concerns that have been raised relative to OBET in South Africa. Stated more specifically, this may be expressed as a critical analysis of SAQA and the NQF.

2.4.2.2 Critical analysis of SAQA and NQF

In their study of the functioning of government organisations that impact on higher education development, Strydom, Hay and Strydom (2001: xi-xii, in Breier 2001) conclude that these organisations "... had been severely impaired by a lack of capacity, unrealistic planning and communication difficulties".

The following academic and administrative concerns are listed specific to the NQF and SAQA:

Academic concerns:

- The negative impact on curriculum coherence of separating the registration of standards and qualifications from the rest of curriculum design. It was pointed out that this should be a bottom-up process, as is recognized in higher education globally.
- The failure to acknowledge openly the complex nature of most educational and vocational outcomes and the difficulty of specifying such outcomes in an easily interpreted form.
- The failure to recognize the impact of process on outcomes and the implications of this for interpreting educational standards.
- The increasing emphasis on assessment rather than teaching and learning.
- The failure to include a focus on excellence.
- The failure to recognize the significance of content and context in assessment of student work and decisions on credit transfer and the recognition of prior learning.

Administrative concerns:

- The array of cumbersome procedures generated by the model.
- The excessive record keeping generated by the model and the large bureaucratic structures now being created to manage the development and implementation of the model.
- The devolved costs envisaged for users of the NQF.
- The need for greater decentralisation of the registration process for rapid handling of changes in knowledge and innovations in a field or sub-field (this also has a pedagogical basis).
- The additional workload for staff in higher education.

(Strydom *et al.* 2001: 55, in Breier 2001)

These authors conclude that the ultimate goal of all education and other strategies should be South Africa's ability to compete internationally for markets and economic development. Competitiveness must therefore impact on curriculum development and other academic activities. Strydom *et al.* (2001: 55, in Breier 2001) acknowledge that higher education may be passing through "... difficult, unstable and competitive times ..." and that a review of aspects of policy formulation and implementation relative to (re)structuring of higher education curricula is critical to ensure the survival of a vibrant higher education sector in South Africa.

Naidoo and Cooke (2001, in Breier 2001: 24) refer to the SAQA qualification process as "curriculum liberation" for technikons, as prior to 1994, technikons were subject to rigid, bureacratic control. Technikons have a greater degree of autonomy over curricula at the institutional level. Naidoo and Cooke (2001: 2, in Breier 2001: 25) state that learning expressed as outcomes liberates teaching staff from the past emphasis on the transmission of subject and content to a level of freedom to design appropriate learning experiences, even irrespective of the location of learning. Although technikons are not exempt from the concerns specific to the NQF and SAQA as listed above, technikons (as opposed to universities) have always offered "market oriented" qualifications. This is generally seen as their biggest advantage in maintaining their competitiveness in the higher education sector. Ogude (2001: 83-84, in Breier 2001) states that according to his

research, technikons had to a large extent accepted SAQA directives "without questioning" and that they were prioritising the major issues such as articulation, quality, flexibility and multiculturalism. While this author does not dispute the "curriculum liberation" experience at technikons, it is his experience that technikons have largely accepted SAQA directives "without questioning" because they in fact do see in it "curriculum liberation". The procedure to be followed in (re)structuring existing curricula has had to be revised following the promulgation of the SAQA Act in 1995. It may be assumed that this has led to considerable delays in the submission of revisions in many existing programmes.

2.4.2.3 Summary of pros and cons in implementation of OBET in South Africa

As was mentioned in Paragraph 2.4.2, the pros and cons of implementing an OBET system in South Africa is still a matter of debate. This debate will not be discussed in this study, however the research envisaged does lie within the ambit of outcomes-based education and a few comments relative to the concerns are considered appropriate. The advantages of OBET have been well marketed by the National Government and the objectives of adopting a national qualifications framework have been discussed in Paragraph 2.4.2.1. The advantages will certainly benefit the horticultural industry, as mentioned before.

A major motivating force for adopting an outcomes-based approach (nationally and internationally) is the need to improve the competitiveness of the workforce. Both the academic and administrative concerns raised in Paragraph 2.4.2.2 above, highlight serious drawbacks to the approach and particularly to the practical implementation of many of the measures. An equally slow process in revising these could follow the current cumbersome process of recording and registering technikon qualifications. The emphasis on assessment rather than on teaching and learning would certainly appear to be a negative feature of this approach. Technological change in most sectors of the horticultural industry occurs at a rapid rate and the training of industry members cannot be delayed. Every effort will have to be made to ensure that in the facilitation of skill/competency (or outcomes) development, these are presented to learners in an optimum learning environment and that qualifications keep pace with the dynamics of the industry. Technikons have traditionally offered career-focused qualifications in co-operation with industry and greater assistance will probably be required of industry in future. It is in fact in industry where technology is best learnt and it is here that OBET outcomes are going to be best facilitated and assessed.

The current process followed by technikons in undertaking curriculum development may be regarded as a top-downs approach because of the institutions of convenor technikons and advisory committees. These institutions have left a legacy, also in the horticultural industry, that so-called experts, whether these are leaders in industry and or in academia, are best able to (re)design curricula. The reference above to a bottom-up approach should be implemented both in the recognition that design must start with the desired learning outcomes and that the outcomes themselves should be identified by the practitioners, particularly those that are closest to the workplace. Technikons have the opportunity in the implementation of OBE to ensure that their programmes are truly market-related and career-focused, but this must be undertaken with a bottom-up approach if they are to be successful.

In the following paragraphs, the process of curriculum development in OBE will be discussed as applied to South Africa and as is being suggested by SAQA and its structures.

2.4.3 Curriculum development in OBE

Curriculum development is founded on learning programmes and these are discussed prior to a discussion of the approach to curriculum development in OBE.

2.4.3.1 Learning programmes

Du Pré (2000: 1-5) defines a programme as a coherent body of knowledge and academic activity aimed at the acquisition of a qualification. Programmes are purposefully designed, each with a "... carefully planned curriculum that combines a strong foundation in one or more academic disciplines with the professional skills required in the world of work". A programme should include the important "transferable skills" or critical outcomes, which enable the learner to meet new challenges in his/her present or changed work environment. As both technikons and universities will be expected to adopt an interdisciplinary approach, graduates will be enabled to become experts in particular fields, with the versatility to work across professional boundaries.

Learning programmes comprise a series of specific outcomes which serve as the basis to establish what knowledge, skills and processes must be mastered in the demonstration of the outcomes. The outcomes-based curriculum emphasises a holistic and integrated approach to learning. Fundamental to its curriculum development process is that this starts with the intended learning achievements or outcomes.

2.4.3.2 SAQA's curriculum development process

Du Pré (2000: 39) states that in terms of the Higher Education Act, higher education institutions are obliged to redesign all their academic courses into coherent programmes. Diplomas and degrees were previously highly structured offerings that gave students little flexibility as curricula were rigidly prescribed. Where diplomas and degrees were unstructured and allowed students to make a wide variety of choices, these were only suited to students who were fully prepared for their course combinations. New diploma and degree programmes will be flexible and will combine the requirements of professional bodies and will include inter-disciplinary electives and generic skills. Programmes will also offer a range of structured options with course combinations that enable students to pursue particular areas of interest, but which are career specific. Students will be prepared for a career and not for vocational training.

The first step in designing a programme is for the designer to set the vision or outcome of the programme and thereafter to design the programme so that student learning on that level is facilitated. Du Pré (2000: 41) warns that an outcomes-based approach to curriculum design means:

- control of the outputs instead of the inputs of learning;
- first determining the end result or learning outcomes of the educational process;
- all teaching/learning/assessment activities are to be defined and organised to deliver these outcomes;
- curriculum design should begin at the end - a design approach;
- opportunities are created for a more learner-centred approach to education.

The following should also be borne in mind:

(a) What trends affect the area/theme in question?
(b) Following upon (a), what kind of practitioner will be needed?
(c) What kind of competence (skills, knowledge, and attitude) will graduates require to survive and flourish in the 21st century?
(d) What kind of qualification will provide for this?
(e) What assessment methods will measure competency?
(Du Pré 2000: 41)

This study is aimed at addressing through a situational analysis the skills/ competencies (or outcomes) required of an entrant into any one of the seven identified sectors of the horticulture industry. Many generic outcomes will be identified which would be applicable to all sectors and also many outcomes specific to one or more of the sectors will also be identified. The extent of the interdisciplinary nature of horticulture will be sought throughout the research study. The locus for the learning of "transferable skills", i.e. SAQA's critical outcomes, will also be sought in the study.

The following paragraph briefly discusses the process of situational analysis for technikon programmes, with the emphasis on SAQA's requirements for the interim registration of qualifications.

2.4.4 Technikon situational analysis prior to SAQA interim registration

Genis (1999: 20) refers to two distinct but interrelated activities that make up curriculum development for technikon programmes. The first phase, Qualification Specification, involved the conducting of future-focused needs analyses and the formulation of purpose statements, exit level outcomes, specified outcomes and assessment criteria for each exit level outcome. In the second phase, the learning programme would be designed with the identified outcomes as starting point (Genis 1999: 7).

The curriculum revision procedure for technikons, as spelt out by the Department of Education (discussed in Paragraph 1.2.1.2) stipulated that prior to completing the so-called "Form B", proposals were to be "cleared" with stakeholders (DoE 1997: 20). The "Revised Form B", issued by the Council on Higher Education on 4 September 2001, requires the convenor technikon to indicate which potential employers and organisations were consulted in the initiation of new programmes as well as the revision of existing programmes (CHE 2001: 3). Genis (1999: 7) states that the situational and needs analysis phase comprises a thorough review of the status and nature of the current qualifications. This includes consultation with fellow providers in areas of overlap, though Genis (1999: 8) states that representatives of areas of overlap do not have to attend needs analysis sessions. Genis (1999: 8) states that in the analysis phase "... *narrow consultation* with key stakeholders takes place". This author states that how this is done is for the individual technikon and programme group/department to decide, but that it was

expected that most would opt for existing advisory committees (Genis 1999: 8). The latter normally include representatives from industry, alumni, professional bodies and labour unions and employers of experiential training students. Genis (1999: 8,21) suggests that brainstorming/nominal group technique be followed with an experienced facilitator. Consensus was to be obtained on the following:

- the necessity and demand for the qualifications or progression of qualifications in the particular sub-field,
- the NQF level,
- the purpose of every qualification,
- exit level outcomes,
- critical cross-field outcomes identified,
- credit allocations,
- assessment criteria identified

(Genis 1999: 8-17).

Genis (1999: 29) states that the situational analysis workshop should examine and identify the roles or general areas of capability one would expect of a graduate of each specific qualification. This was to be followed by an examination of every role or general area of competence, providing that the workshop cluster or group outcomes that comprise an exit level outcome. Genis (1999: 11) states that the so-called DACUM process (Development of A Curriculum) could be used in this regard.

Reference was made to the procedure which was to be followed in determining those aspects listed above and for which Genis (1999: 8) states consensus should be reached. As was explained in Paragraph 1.2.2.2.1, the Cape Technikon, as convenor technikon, suggested that the other technikons offering horticultural programmes use the result (i.e. the minutes) of the joint meeting of Advisory Committees of the Cape Technikon and Peninsula Technikon (Appendix 1.1) as basis for their own situational analyses. These technikons met with their advisory committees and minor changes were passed on to the Cape Technikon, which was then able to prepare a final document for submission to SAQA. Consensus (prior to this submission) was therefore obtained between the five technikons and their advisory committees.

2.4.5 Technikon situational analysis subsequent to SAQA interim registration

The procedure to be followed by educational providers in having their qualifications upgraded from interim registration to full registration on the NQF is not a complex one and does not require stakeholder input.

The process to be followed by educational institutions in obtaining full registration of the interimly registered qualifications has been set out in SAQA's (2000) *Criteria for the generation and evaluation of qualifications and standards within the National Qualifications Framework (*as well as in the format template to be used together with the set out criteria). The CTP has requested convenor technikons to include non-convenor technikons in the review process. No further stakeholder involvement has been requested either by SAQA or by the CTP at this stage. This procedure requires convenor technikons to have at least made contact with potential employers and organisations (their comments are required) and where vocational councils, associations, institutes and interest groups regulate the particular vocation at national level, their written confirmation of the acceptability of the proposed programme is required (CHE 2001: 3). All Cape Technikon Heads of Departments have been notified that where technikons are considering revision (and not only review), the Form B procedure still applies (Cape Technikon 2002b: Letter, 4 June).

The procedure being followed by the Cape Technikon (subsequent to interim registration) in leading the non-convenor technikons that offer programmes in Horticulture in the process of obtaining full registration, is described in the following paragraph. Emphasis will be placed upon aspects relative to curriculum design.

2.4.6 Situational analysis in this study subsequent to SAQA's interim registration

As was mentioned in Chapter 1, the five technikons offering horticultural programmes resolved at a meeting on 12 April 2002, not to revise the existing qualifications at this stage, but to first wait for full registration (see Appendix 2.1). This meeting agreed that the technikon qualifications in Horticulture should be written in unit standards format as the SGB for Ornamental Horticulture and Landscape would most likely request that this be the required format. It was also agreed that unit standards be written for the underlisted sectors of the industry and that each of the five technikons accept responsibility for preparing the draft standards for each sector:

Amenity Horticulture	-	Natal Technikon
Arboriculture	-	Technikon SA
Floriculture	-	Technikon SA
Landscape	-	Natal Technikon
Production Horticulture	-	Cape Technikon
Retail Horticulture	-	Peninsula Technikon
Turfgrass	-	Pretoria Technikon

This meeting resolved to finalise an initial draft of the unit standards for the above sectors to levels 5, 6, 7 and 8a by 14 April 2003. These would then be presented to all industry associations and organisations for consideration in a process that would ensure broad representation of all those affected.

This study was initiated well before the interim recording of qualifications on the NQF and while it has undertaken a situational analysis of the horticultural industry, this has not been solely directed at meeting the requirements of either SAQA in this respect nor of any of the five techikons in particular. The researcher's objective has been to undertake a thorough situational analysis which may be used to inform (and direct) the horticultural industry as it deems fit. If the findings are able to service the needs of the industry in identifying curriculum development requirements and in particular to assist it in the design of revised curricula, the study will have served its purpose.

The situational analyses undertaken by the five technikons prior to interim registration have been very broadly extended in this study. These situational analyses were not based on the gathering of empirical data using scientific research methods, but upon the opinions of selected industry members together with technikon staff. This research will endeavour to study at depth and using three distinct techniques, the curriculum development needs of the horticultural industry. These techniques emanate from both the quantitative and qualitative research methodologies and their application to a situational analysis in horticultural curricula will be presented in the following chapter.

2.5 SUMMARY

This chapter, following on the previous chapter where the problems of curriculum development in horticulture were specified, describes various related theoretical aspects of curriculum development. The objective in this was to contextualise situational analysis within the process of curriculum development at technikons.

The terms *curriculum* and *curriculum development* were defined. *Curriculum* is seen as a dynamic process aimed at an educational "track" or plan of instruction and *curriculum development* as a four-phase process that includes design, dissemination, implementation and evaluation. The principles of curriculum development were identified and their inclusion in this study was explained. The application of curriculum development models as a means of elucidating the process of curriculum development was presented. Carl's identification of *contextual evaluation*, which includes situational analysis, as the hub of the curriculum development process, was discussed.

Both the nature of the curriculum design process and the different levels of curriculum development were discussed. Criteria that guide the curriculum design and by which the design is held accountable were also listed. The focus of this research on one of the sub-phases of curriculum design, viz. situational analysis, was described and the process of undertaking a situational analysis was also presented together with an analysis of the possible information sources.

Various approaches to curriculum development were presented and this researcher's approach as lying between experiential and technological was explained. Three dichotomies were presented as contrasting approaches to curriculum development. These were a content vs a process approach, a deep vs a shallow approach and an individualistic vs a directed approach to curriculum development. The recommended location of horticultural curricula on these three continuums was identified as the following: a process approach, a deep learning approach and a directed curriculum approach.

The restructuring of the system of higher education in South Africa in which academic courses will be offered using a programmes and an outcomes-based approach was explained. The advantages and various criticisms of OBET in South Africa were presented. This had direct reference to SAQA and to the NQF as these structures of the

revised educational system affect technikon education. Various stipulations as proposed by SAQA relative to the process of curriculum development in outcomes-based format were explained. The most important of these is that the curriculum development process must start at the conclusion of a learning activity (i.e. the outcomes) and not at the onset of learning. The process recommended by the CTP Working Group for technikon curriculum revision prior to SAQA's interim registration on 30 June 2000 was explained. Reference was also made to the procedure followed by the convenor technikon and the other technikons offering horticulture courses in preparing for interim registration. The procedure to be followed in submitting interimly registered qualifications for full registration on the NQF was also explained. The status in the process currently being followed by technikons that offer horticultural programmes was explained.

The chapter that follows will present an analysis of the techniques of personal interviews, focus group interviews and a mail questionnaire survey as applied to a situational analysis of the seven sectors of the horticultural industry. It will seek to show the relevance of each technique, the quantitative and qualitative approaches to research methods followed and how a triangulation approach can be used to improve the generalisability of the findings and also improve the validity and the reliability of the research techniques.

CHAPTER THREE

RESEARCH METHODOLOGY AND PROCEDURES

3.1 INTRODUCTION

In this chapter a description will be given of the research methodologies used in this study. The typifying of the study as exploratory and descriptive is motivated. Both the qualitative and the quantitative approaches will be briefly described, as well as the methods used within these approaches in this study. A means of transcending the quantitative-qualitative divide will be presented. The application of both a quantitative and a qualitative approach to this research will be discussed. This will focus on their complementing one another, e.g. whereby data of a qualitative nature may be generalised using a quantitative research method.

3.2 APPLICATION OF EXPLORATORY AND DESCRIPTIVE RESEARCH TO THIS STUDY

This study will address the problems identified in Chapter 1 and will endeavour to do this by means of an in-depth investigation into curriculum development in Horticulture. The study will specifically address the first stage of curriculum development, i.e. curriculum design. A thorough analysis will be executed using three different research methods or techniques for generating data, namely personal interviews, focus group interviews and a mail questionnaire survey.

Churchill (1991: 132) lists the following reasons for an exploratory study and evaluating these, one may quite confidently define this research as exploratory because it is investigative and seeks to obtain clarity and generate understanding of the problems being addressed:

- formulating a problem for more precise investigation or for developing hypotheses
- establishing priorities for further research
- gathering information about the practical problems of carrying out research on particular conjectural statements
- increasing the researcher's familiarity with the problem
- clarifying concepts.

The application of exploratory research to curriculum development in Horticulture is considered relevant because little documentation exists regarding the specific skills and competencies being applied by horticulturists within the different sectors of the industry. The employment of personal interviews and focus group interviews as the first two phases of this study will provide the researcher with an opportunity to undertake an exploratory investigation into the success and/or failure of the current curricula as well as the curriculum development needs of the industry.

Descriptive research on the other hand would be applied to "... describe the characteristics of certain groups, to estimate the proportion of people in a specified population who behave in a certain way and to make certain predictions ..." (Churchill 1991: 144). Churchill (1991: 144) states that a study that has a descriptive approach is not simply a fact-gathering expedition. One of the methods of undertaking descriptive research is by means of cross-sectional analysis, which provides a snapshot of the variables of interest at a single point in time. The snapshot or sample of elements (or units) is typically selected to be representative of some known universe. This technique is a sample survey where great emphasis is placed upon selecting sample numbers, identified by random probability (Churchill 1991: 157).

A quantitative approach in educational research, which is descriptive by nature, should therefore strive at understanding the meaning and relevance of the data gathered. While this approach may attempt to gather as many empirical facts as possible about the variables under investigation, Ferber, Blankertz and Hollander (1964: 153, quoted in Churchill 1991: 145) state: "What makes facts practical and valuable is the glue of explanation and understanding ... "

The first two phases of this study will make use of a qualitative research approach, which will serve to set the scene for the third phase, the application of a mail self-administered questionnaire. Deeper meanings are ideally discovered in a study that has a qualitative approach and this is the reason for the use of personal interviews and focus group interviews in this study. The third phase of this study will utilise a quantitative approach. The mail questionnaire will also be applied to discover greater understanding of the requirements of a curriculum for Horticulture, but because it will be applied on a national basis, it will provide for the generalisability of the findings.

Johnson and Christensen (2000: 6-7) refer to applied research as research which is aimed at

answering "real world", or practical questions in order to provide immediate solutions. This would typically involve identifying a local problem, planning and executing the research, developing new knowledge based on the research and implementing the findings to solve or improve a local problem. This study, which is applied to the curriculum development needs in the localised horticulture industry, is an applied research study because it will strive to identify new knowledge that may be used to solve real-life problems.

The characteristics of both a quantitative and a qualitative approach will be discussed in the following paragraphs. This researcher's stance relative to the quantitative-qualitative debate will be further positioned and motivated.

3.3 USE OF QUANTITATIVE AND QUALITATIVE METHODS

The selection of research methods rests to a large extent on the researcher's stance or point of view *apropros* both the quantitative-qualitative discourse and the objectives of the research. The locus of any research study in terms of the researcher's epistemological or world point of view should be clarified at the onset of the study and clearly stated at the conclusion, when the research results are reported.

Henderson (1991: 1) compares the use of quantitative vs qualitative methods and states that while these two approaches are often considered to be antithetical, they are not necessarily opposites, even though they are generally regarded as being mutually exclusive to one another. Krueger (1988: 39) states that evaluation researchers are increasingly recognising the benefits of combining quantitative and qualitative procedures and that this results in greater methodological mixes that strengthen the research design. The researcher's motivation in selecting a particular approach may for example lie in wanting to make inferential statements applicable to broad audiences or it may lie in discovering the in-depth meanings of phenomenon.

The central characteristics of the quantitative and the qualitative approaches will be explored below as well as a means of transcending the quantitative-qualitative divide. This relates to triangulation.

3.3.1 Quantitative research

Anderson (1998: 3) states that an empirical researcher will assert that things are only meaningful if they are observable and verifiable. The research would emanate from positivist theory or the quantitative research paradigm. In his article on the use of qualitative research in education and the critical use of rationality and which specifically addresses this debate, Waghid (2000: 26) states that positivism claims that " ... all events we may want to explain are 'facts in the world', that is, of the same logical type". Values are regarded as subjective, as are feelings or attitudes and cannot be rationally argued. The positivist or "scientific" paradigm, according to McMillan and Schumacher (1989, quoted in Waghid 2000: 26) is aimed at four interrelated categories: to describe, to predict, to control and to explain. Causal relationships in this approach are centrally placed in explaining the clear linkages between variables and these are rooted in hypotheses. Prediction is satisfied because the researcher will strive to generalise his/her findings beyond a particular research setting. The ability to replicate studies and their findings, thereby avoiding research bias and ensuring the reliability of the findings, is critical to the quantitative approach (Marcinkowski 1993: 41, quoted in Waghid 2000: 26).

Waghid (2000: 26) states that where education research is based upon empirical positivist theory, this research methodology sees meanings as separate from people's subjective interpretations, consciousness and intentions. The positivist approach draws on neutral, objective and statistical language, which includes the use of questionnaire-driven surveys (Kelchtermans & Schratz, 1994, quoted in Waghid 2000: 26). Oosthuysen (1997: 29) states that quantitative research emphasises the quantification of the phenomena under investigation and that in this approach the researcher considers that virtually all things are quantifiable, whether in terms of a logically numerical unit or some kind of sensory impression. The measurement of an object, behaviour or incidence is possible when one considers that the characteristics of each of these can be subdivided into different levels to which numeric values are attached. In the quantification of intangible phenomena, the quantitative researcher is able to describe the results of the research in specific terms and relationships (Oosthuysen 1997: 29).

Niemann, Niemann, Brazelle, Van Staden, Heyns and De Wet (2000: 283-286) address the issue of reliability, validity and objectivity in qualitative research in their article and specifically contrast these criteria within the quantitative and qualitative approaches. The positivistic

research approach emphasises as point of departure the use of statistical measuring instruments, in undertaking its research, which are based upon the methodological principles of reliability, validity and objectivity and these are only attainable through strict regulation, dissociation from prejudice, impartiality and neutrality (Niemann *et al.* 2000: 283).

The principles of reliability, validity and objectivity will each be discussed below with broad reference to their application to the quantitative approach used in this study:

3.3.1.1 Reliability

Niemann *et al.* (2000: 283) state that reliability in quantitative research is associated with accuracy, stability, consistency and repeatability of the research. Johnson and Christensen (2000: 122) contend that reliability refers to the consistency or the stability of a response. According to Niemann *et al.* (2000: 283) the core meaning of methodological reliability is the absence of random errors. The implication of these statements is that operating under the same methodological conditions, another researcher should conclude his/her research with the same results. Johnson and Christensen (2000: 122) state that the reliability of a test or assessment procedure can be determined by Test-Retest, Equivalent-forms, Split-half, Internal consistency and Inter-scorer and that each way of testing provides a slightly different index of reliability.

3.3.1.2 Validity

According to Johnson and Christensen (2000: 122) validity refers to the appropriateness of the interpretations and actions the researcher makes based upon the score or scores one would get from a test or assessment procedure. Validation is therefore regarded as the process of gathering evidence to support the inference the researcher will be making from the score results. Quantitative research is aimed at being able to make inferences to a broader population where the inferences are justifiable and defendable (in the positivistic paradigm). Johnson and Christensen (2000: 106-107) state that validity refers to the empirical evidence and theoretical rationales that support the interpretations, actions and inferences taken as a result of the score results. These authors (Johnson & Christensen 2000: 122) refer to content validity, criterion-related validity and construct validity as means by which evidence of validity may be collected in educational research.

A differentiation is made between internal and external validity. The former refers to the ability to infer that a causal relationship exists between two variables and the latter to the extent to which the study results can be generalised to and across populations of persons, settings and times.

The quantitative approach followed in this study relates to the use of a self-administered questionnaire as follow-up to the findings already obtained from the foregoing qualitative methods. The questionnaire largely comprised closed-ended questions, which resulted in ordinal-type data being collected. These results may be considered as quantitative, however they are far less so than experimental research which is strictly quantitative. The construction of the questionnaire survey used in this study was based upon the qualitative data collected in using personal interviews and focus group interviews. It should therefore be borne in mind that the assumptions and the inferences made from this survey were based upon ordinal-type data and that the research is descriptive and non-experimental and should not be seen as being causal and based upon hypothesis testing. Johnson and Christensen (2000: 209) describe descriptive validity as the factual accuracy of the account as reported by the researchers. The objective of this study is to describe the situational analysis in curriculum development in Horticulture following its investigation, and therefore descriptive validity is essential to its scientific validation.

3.3.1.3 Objectivity

In quantitative research, objectivity according to empirical-analytical researchers, is attributed to the regimented, impartial or unbiased, value-free or neutral way in which it is conducted (Lather 1991: 50; De Groot 1969: 163, quoted in Niemann *et al.* 2000: 283). Lather (1991: 52, quoted in Niemann *et al.* 2000: 284) states that any research that does not meet these conditions and discloses its value-base, is discounted and regarded as subjective and "non-scientific". Quantitative research methods emphasise the avoidance of distortion and the independence of subjective differences between researchers. The subjectivity of the researcher is regarded as a hindrance and objectivity can only be achieved by the use of specific, standardised methods. Niemann *et al.* (2000: 284) state that quantitative researchers are expected to separate themselves from the research in order to be able to operate as a robot, i.e. in a totally unbiased manner.

The following paragraph refers to the application of quantitative methods to this study.

3.3.1.4 Quantitative research in this study

One of the central research methods to be utilised in this study is the national mail questionnaire referred to above. It will comprise mostly of closed-ended questions. The majority of questions will ask respondents for their opinion on many intangible issues, e.g. identification of skills/competencies, attributes required of a qualified horticulturist. As respondents to the mail questionnaire will largely respond using ordinal scale categories, the quantification of the findings using basic descriptive statistics is possible. This will enable the researcher to generalise the results to a national level. The data generated from the mail questionnaire will provide the researcher with data that is based upon first-hand experience, i.e. empirical data. As descriptive research is largely qualitative, the parameters for ensuring that the reliability and the validity of the methods utilised in this study are maintained, applies equally to both the quantitative and to the qualitative approaches followed. The measures listed below therefore apply to both approaches.

The research will not only be based upon quantitative data, but also upon qualitative data, which is discussed below.

3.3.2 Qualitative research

The former approach places considerable faith in numbers that represent opinions or concepts while the qualitative approach concentrates on less measurable phenomena (e.g. opinions, meanings and observations) to express reality and attempts to describe people in natural situations (Krueger, 1988: 37). Qualitative approaches serve to explore and predict and assist the researcher as he or she strives to "uncover and understand any phenomenon about which little is known" (Van Maanen, Faulkner & Cabbs 1982: 53). Mouton (1996: 169) states that this approach is known as the insider perspective, an approach that requires the researcher to stay close to the subject. Decrop (1999: 157) states that interpretivists whose topics are better approached by qualitative methods, focus on what is specific and unique in order that they may understand and generate interpreted meaning. In using qualitative data, the researcher's approach arises from the post-positivistic or qualitative research paradigm (Anderson 1998: 4-5).

Maykut and Morehouse (1994: 45-47) list the following characteristics of qualitative research:

- It has an exploratory and descriptive focus in which the researcher allows the data to emerge in the study.
- It follows an emergent design whereby the research design is allowed to unfold as the study progresses.
- There is a purposive sample where participants are carefully selected for inclusion because they will likely expand the variability of the sample.
- Data collection occurs in the natural setting because the context of understanding the respondent's contributions is important.
- Emphasis is placed on "human-as-instrument", where the researcher has the responsibility of not only gathering information, but also of extracting meaning from the information presented.
- It employs qualitative methods of data collection, e.g. observation of the respondent's action and behaviour.
- Early and ongoing inductive data analysis is used, where the researcher allows patterns and data to "reveal themselves", rather than impose limitations on respondents (e.g. open-ended questions).
- It has a case study approach to reporting research outcomes, often presented in original narrative.

Lincoln and Guba (1985, quoted in Decrop 1999: 158) list four precise criteria for qualitative inquiry that parallel the quantitative terminology. Decrop (1999: 158) states that these criteria are useful in establishing canons for qualitative research and that with triangulation, serve to heighten the trustworthiness of the qualitative methods. These criteria are:

1. Credibility (internal validity): How truthful are particular findings?
2. Transferability (external validity): How applicable are the research findings to another setting or group?
3. Dependability (reliability): Are the results consistent and reproducible?
4. Confirmability (objectivity): How neutral are the findings (in terms of whether they are reflective of the informants and the inquiry and not a product of the researcher's biases and prejudices)?

In discussing whether qualitative educational research is a soft or a hard option, Henning (1995: 29) asserts that rigorous qualitative research (as in Decrop's trustworthiness) is a solid

option and that naive or crude empiricist qualitative research probably deserves the stigma "soft option".

Further to the above, using the criteria of the positivistic research method as point of departure, Niemann *et al.* (2000: 283-285) list the measures that the qualitative researcher could use to defend his/her scientific integrity.

These measures, which emanate from the principles of reliability, validity and objectivity will be discussed below with broad reference to their application to the qualitative approach used in this study.

3.3.2.1 Reliability

Niemann *et al.* (2000: 283-285) distinguish between internal and external reliability and advise qualitative researchers to apply various measures to increase the reliability of the study. Internal reliability refers to reliability during the research project and external reliability to the verification of the findings of the research. This study provided for triangulation, peer examination, member checks, selection and training, auditing and mechanisation as measures to increase internal reliability. A "thick" description of the procedures followed increased the external reliability. These are all listed by Niemann *et al.* (2000: 284) and will be discussed briefly.

(i) Internal reliability

Niemann *et al.* (2000: 284) credit the following authors with the underlisted measures to increase internal reliability: Smaling (1994: 81-82), Goetz and LeCompte (1984: 213; 217), Miles and Huberman (1994: 231-243), Guba and Lincoln (1982: 241-243), Denzin (1988: 511) and Pfaffenberger (1988: 28; 30):

- Method Triangulation - whereby the personal interview technique was followed by focus group interviews and a mail questionnaire as measure to crosscheck the collection of data from the same source.
- Peer examination - whereby the likelihood of casual misinterpretations infiltrating the findings is minimised.
- Member checks - whereby contradictions in the findings are identified by referral of

the findings to participants for confirmation.

- Selection and training - whereby assistant researchers are thoroughly selected and trained so that they are competent to assist.
- Auditing - whereby all information regarding the research, i.e. raw data, computed data and independent persons, preserve notes for verification.
- Mechanisation - whereby audiotapes are stored and data captured on computer are stored.

(ii) External reliability

Niemann *et al.* (2000: 285) state that Smaling (1994: 82) and Goetz and LeCompte (1984: 213-217) were of the opinion that a qualitative report should contain the following measures to increase external reliability:

- A "thick" description which relates to a full exposition of the interviewees selected, the methodological approaches followed and the interviewing process. In declaring the finer details of the research process and explaining its sequential development, the researcher endeavours to ensure that the research would be replicable by another researcher.
- An exposition of the theoretical starting points and arguments underlying the various choices made in the research.

The internal reliability of the qualitative research methods used in this study have been ensured by the use of triangulation, peer examination, member checks, selection and training, auditing and mechanisation. A "thick" description of the procedures followed was used to increase the external reliability.

3.3.2.2 Validity

Goetz and LeCompte (1984: 221, quoted in Niemann *et al.* 2000: 285) state that researchers from the quantitative and qualitative paradigms can determine the degree of validity by asking the following questions:

"Are the researchers really measuring or observing what they *think* they are, and to what degree have the findings also been tested or refined by other researchers?"

Stressing that which was said earlier in Paragraph 3.3.2, Nyamathi and Shuler (1990: 1284) state that the validity of qualitative research instruments is more appropriately assessed by credibility than with validity. Benoliel (1984: 1-8, quoted in Nyamathi & Shuker 1990: 1284) states that the criteria for deciding about the validity of qualitative research needs to take into account the influence of subjective meanings and interpretations. Credibility is realised when there is discursive congruence between the participants and between the moderator and the participants on the subjective reality (or believability) of individual and group beliefs, opinions and interpretations (Nyamathi & Shuker 1990: 1284).

Niemann *et al.* (2000: 285) state that as with reliability, in validity it is essential to strive towards the elimination of systematic errors in both internal and external validity. These authors state that internal validity relates to validity *within* the research study and external validity to the validity of the results regarding the *intended* object of the study. Niemann *et al.* (2000: 285) credit the following authors with the identification of the underlisted measures to increase the internal and external validity of qualitative research: Smaling (1994: 83-87), Campbell (1988: 72), Goetz and LeCompte (1984: 222-228), Miles and Huberman (1994: 231-243) and Denzin (1970: 201):

(i) Internal validity

Content and concept validity could be ensured by:

- the preparation of a comprehensive register of data, notes of relevant actions or events, theoretical and methodological memoranda and categories of data to be used during data analysis;
- establishing member checks, peer debriefing and audit trails which facilitate cross-checking and corrections;
- guarding that the researcher does not influence the participants by his/her bias, influences and prejudices as these may affect participant responses;
- indicating to what extent the researcher's attitude has changed through exposure to the research.

Logical validity is related to the logic of the research framework and is achieved by:

- striving for a balance between the collection of data from participants, i.e. "letting the object speak for itself" and the systematic analysis of data using abstracted categories for analyses and interpretation;
- gathering data until the point of *theoretical saturation* has been reached, i.e. terminating the process of data collection when no new affirmative or contrasting information is obtained;
- searching for so-called negative or extreme data.

(ii) External validity

External validity can be secured by:

- the researcher fully and accurately describing the research process, including the reasons for the choice of methods and the circumstances and context of the research;
- a "thick" description of the research situation and context so that peers are able to evaluate the validity of the research.

The consistent maintenance throughout the study of both internal and external validity was ensured by the adoption of the above listed measures. These were adopted at the outset and retained throughout the study. Accurate records of the interactions with all participants were kept and the subjective value of each of these interactions was acknowledged therein.

3.3.2.3 Objectivity

Keller (1985: 117, quoted in Niemann, *et al.* 2000: 284) states that in qualitative research objectivity is only possible if the object (i.e. the researched) has been "listened to" and when there has been a "full turning towards the object". Niemann *et al.* (2000: 284) describes the principle that needs to be fulfilled by the researcher as one of "role-taking", whereby the researcher "wears the shoes" of the researched to be able to understand, anticipate and interpret the behaviour or experience of the other person. Johnson and Christensen (2000: 207) state that researcher bias is a potential threat to the validity of the research and recommend that the researcher engage in critical self-reflection (called reflexivity) about his/her potential biases and predispositions. Through reflexivity the researcher becomes more self-aware and able to monitor and control his/her biases. It is prudent for qualitative

researchers to declare their potential biases by means of an honest exposition of their personal background and how this may affect their research and furthermore to explain how they intend to counteract any potential bias.

The use of qualitative research in this study is briefly explained in the following paragraph.

3.3.2.4 Qualitative research in this study

The use of a qualitative approach in this study will enable the researcher to explore the research terrain and discover the "burning issues". The use of personal interviews will enable the researcher to investigate at depth the curriculum concerns of a number of purposively selected practitioners. The use of focus groups will be particularly useful in delving into the core of the matters under discussion, e.g. "What values are important to the role of horticulturist?" The situational analysis undertaken in this study has at its essence the evaluation of the skills and competencies required of a qualified horticulturist. This is a value-laden topic and one that should be seen from the perspective of the participants in the study.

The mechanisms followed by the researcher in maintaining the rigour of a good qualitative approach have been set forth above. Reliability has been ensured primarily by the measures followed in doing the research and validity and objectivity by the recognition of the subjectivity of qualitative research and by reporting upon the study in as honest a manner as possible.

The following section will seek to compare the application of the quantitative and qualitative approaches and will ask whether the researcher may avoid making a choice between the two. Arising from this choice, triangulation is discussed as an alternative approach to the narrow quantitative-qualitative divide. The researcher's approach is thereafter presented and motivated.

3.3.3 Transcending the quantitative-qualitative divide

Henderson (1991: 1) compares the use of methods that emanate from the quantitative vs qualitative approach and states that while these two approaches are often considered to be antithetical, they are not necessarily opposites. Krueger (1988: 39) states that evaluation researchers are increasingly recognising the benefits of combining quantitative and qualitative procedures and that this results in greater methodological mixes that strengthen the research

design.

The following paragraph discusses the triangulation approach to research methodology, which is neither purely quantitative nor purely qualitative and therefore transcends the quantitative-qualitative debate.

3.3.3.1 Triangulation

Rossman and Wilson (1985: 627-628) state that the history of educational research has been dominated by a quantitative orientation and that qualitative perspectives have only recently become recognised as a component of research literature. Trow (1957: 33-35, quoted in Rossman & Wilson 1985: 628) argue that no single technique could lay claim to a monopoly on inference and that in the past decade an increasing interest in combining methods was noticeable. The same authors (Rossman & Wilson 1985: 629) identify three distinct perspectives on combining methods. These are the purist, the situationalist and the pragmatist. The purists hold that quantitative and qualitative approaches derive from different, mutually exclusive paradigms that cannot be combined. The situationalist recognises that both approaches have value, that they may be used in a complementary manner in the same study, but that each method has usefulness in a specific situation or phase of the research process. Rossman and Wilson (1985: 631) argue that the first two perspectives foster little integration, but that the pragmatist would argue for the integration of methods in a single study.

Decrop (1999: 158) states that the choice of the appropriate research design and methods is directed by the relationship between the knowledge (phenomenon) and the knower (person or thing possessing the knowledge) and that in the quantitative-qualitative debate, methodological eclecticism is desirable. In addressing the debate on behalf of tourism researchers, Decrop (1999: 158) recommends the application of the criteria listed by Lincoln and Guba (see Paragraph 3.3.2 above), by which a qualitative study's trustworthiness can be assessed. Secondly, he proposes that triangulation be used to make qualitative findings more sound.

Triangulation implies that a single point is considered from three different and independent sources. Borrowed from topography, triangulation in research means looking at the same phenomenon or research question from more than one source of data. Decrop (1999: 158)

states that personal and methodological biases are limited and the study's generalisability is enhanced because when the research problem is viewed from different angles, information is corroborated, elaborated and illuminated. Denzin (1978, quoted in Decrop 1999: 159) identifies four basic types of triangulation: data triangulation, method triangulation, investigator triangulation and theoretical triangulation. The first involves the use of a variety of data sources in a study, the second refers to the use of multiple methods to study a single problem, the third concerns using different researchers to interpret the same body of data and the fourth involves the use of multiple perspectives to interpret a single set of data.

In summing up the application of a triangulation approach, the scientific method is improved because biases are limited in varying ways in that different methods have been applied. It may take a pragmatist to opt to triangulate, but in triangulating his research, the researcher increases the trustworthiness of the research and at the same time the researcher gains an enriched explanation of the research problem.

The following paragraphs will set forth the particular research approach as well as the application of the specific research methods to be followed in this study.

3.3.4 Research approach and research methods in this study

This study will adopt a triangulation approach in that the qualitative methods applied initially will be followed by a quantitative method, primarily as means of corroborating or complementing the information obtained from the earlier methods and as means of generalising the findings to a national level. Rossman and Wilson (1985: 633) state that the view adopted by most of the research community is that quantitative methods are the most appropriate source for corroborating findings initially identified using qualitative methods. Furthermore, qualitative methods are best used to provide richness or detail to quantitative findings, leading to the elaboration of the results. Qualitative methods should precede quantitative methods when the study has still to be initiated, as these will clarify the direction of the enquiry. This study will use a qualitative approach to study the broad scope of the identified problems and to provide richness and depth to the research. The triangulation approach in this study will also be utilised to ensure that the study is rigorous in its application of both quantitative and qualitative methods.

In this study, where personal interviews and focus group interviews precede the quantitative

methods, the researcher intends to discover as best as possible, the thinking pattern of the target audience and to identify problems that may develop in the quantitative phase. The insights gained will enable the researcher to develop more efficient follow-up quantitative procedures than if only personal interviews had been used. Particularly as the focus group interviews will be applied to each of the seven sectors of the industry, the researcher will be able to investigate the curriculum development needs of each at considerable depth. The inability to generalise from focus groups is probably one of its major disadvantages, however when triangulated (as in this study), with a quantitative procedure (like a mail survey/questionnaire), the researcher is able to make inferences about the larger population.

A key element of curriculum development as a process is that it must include a situational analysis, i.e. an investigation into the existing curriculum and its fulfilling or not fulfilling client needs (Mostert 1985: 24-25). It must, if it is to serve any useful purpose, make recommendations for a curriculum, which will serve a future client base. It is essential in curriculum development in higher education to determine the training needs of a particular industry. This essentially means communicating with the persons (or a sample of these) concerned by means of *inter alia* personal interviews, group interviews and/or a survey questionnaire (Mostert 1985: 154-158). While the latter may include empirical data and be essentially quantitative, the former would always be of a qualitative nature.

This study is descriptive in that it aims to describe the current position in curriculum development in Horticulture. As a study using both quantitative and qualitative methods, it will make recommendations for changes in those curricula that serve the horticulture industry. In using both approaches, the study will triangulate across the methods followed in an endeavour to understand, predict and communicate. The study will utilise the research process as a vehicle of change in that participants will be involved in "making something better", in developing a revised curriculum for the horticulture industry that is just and equitable.

3.3.5 The particular role of the researcher in this study

The researcher saw his particular role in this study as that of investigator. The problems of curriculum development in horticulture programmes at technikons in South Africa are essentially that current programmes have not been developed with full knowledge of either the lecturing staff or the practising horticulturists. The researcher's aim will be to explore the

jobs being undertaken by horticulturists within the seven sectors of the industry. Once the skills and or competencies have been pinpointed by means of both personal and group interviews, confirmation of these will be sought on a national basis.

As the researcher has spent many years in teaching and in practising horticulture, he will be a participant/facilitator in the research process, striving throughout to ensure that the study reaches its goals using impartial and honest methodologies. As qualitative researcher, he will attempt to "investigate" by listening to the interviewees (and recognising his potential subjectivity). As quantitative researcher he will again "investigate", but this time by using a measuring instrument (self-administered questionnaire) that will seek to enumerate the extent of opinion on any particular issue. In declaring the findings of his investigation, the researcher would hope to declare that his information is representative of the attitudes and opinions of the broader industry and that his role has been that of impartial and honest explorer. The product of the study should be a document that accurately and honestly describes the curricula needs of the industry and makes a positive contribution to curriculum development.

The following paragraphs will discuss in detail the methodological issues relating to the quantitative and qualitative approaches to this study and also the methodological issues relating to the research methods applied.

3.4 RESEARCH METHODS APPLIED

The selection of research methods for this research has been based upon the researcher's world-view that as pragmatist (and not discounting the objectives of this particular study), a triangulation approach would provide the best of both the quantitative and the qualitative worlds. The research methods utilised in this study have been selected for their contribution to a composite understanding of the curriculum development needs in Horticulture and the ability to generalise the findings to a national level. The qualitative techniques of personal interviews and focus group interviews comprised phases one and two, followed by a quantitative self-administered survey questionnaire as phase three.

The personal interviews were conducted with 25 horticulturists who are employed in the Western Cape. This exploratory research was aimed at clarifying the *modus operandi* for a fuller investigation. The 14 focus group meetings which followed this, were aimed at

identifying at greater depth, the curriculum needs within the seven identified sectors of the horticulture industry. Both of these techniques are qualitative and rest upon gathering data that is descriptive, non-quantitative and rich in meaning. The focus group interviews were also applied in the Western Cape only.

In an attempt to corroborate the findings of the above and also to rationalise the research study, a questionnaire survey was directed to a sample of all professional institutes/bodies throughout the country who operate in the field of horticulture. The application of this technique to the research study was planned as a means of triangulating the research methodology and thereby enabling the researcher to generalise the data obtained by the earlier qualitative methods. The questionnaire survey has provided a quantitative base to the research as it has allowed the researcher to obtain data from a representative sample of the population of horticulturists in the country.

The three research methods used in this study will be discussed below. This discussion will focus firstly on the reasons for the selection of the specific technique, followed by a discussion of methodological issues. The criteria for rigorous quantitative research i.e. its reliability, validity and objectivity and the comparable criteria for qualitative research will be discussed below for each of the three techniques. The three techniques will also be discussed in terms of the literature and its recommendations and this will be juxtaposed against the three techniques and their application in this study.

3.4.1 Phase 1: Personal interviews

The motivation for using personal interviews in this study will firstly be discussed. This will be followed by a discussion on the reliability, validity and objectivity of this research technique and an explanation of the research design and the interview procedure followed in this study.

3.4.1.1 Motivation for using personal interviews

In evaluating the use of individual interviews, Burns (1989: 47) states that it has become a relatively neglected technique, often not preferred for cost reasons to the focus group. She defends the individual interview technique however, as an essential research technique *inter alia* for the enrichment of other techniques. It provides the vocabulary to be used in a structured questionnaire but more importantly, defines all the options that need to be included

in the questionnaire. Marsden, Oakley and Pratt (1994: 135) state that interviews may be structured and unstructured and while the former rely on predetermined questions being asked in a set order, unstructured interviews permit questions to be more flexible and are of a greater qualitative format with respondents replying in their own words. Henderson (1991: 73-74) states that the structured interview may comprise closed-ended questions or standardised open-ended questions. In the latter the interviewee is able to respond as he or she wishes, though the exact wording and sequence of questions are maintained throughout all interviews.

The unstructured interview may comprise a purely qualitative form where the format is an informal conversational interview, or alternatively an interview schedule may be used to ensure that all topics are covered. The way questions are asked as well as the sequence of questions is not specified (Henderson 1991: 73).

The objective of utilising personal interviews in this study was to enable the researcher to determine the extent of the need for curriculum revision and to gauge interviewee response to current changes in curriculum development (OBE) and to determine how these would affect the horticulture industry. The interview technique selected was therefore unstructured in that questions were open-ended and allowed respondents to answer freely. The researcher made use of an interview schedule, thereby ensuring that all topics were covered. The technique was used as a pre-test to the focus group interviews and the mail questionnaire.

Burns (1989: 57) states that if used correctly the personal interview is "... *the* deep digging tool" and that serious consideration should be given to using group discussions and individual interviews in a complementary relationship. Used in this study as an investigative tool, the personal interview has served a useful purpose in directing and enriching the other techniques. A comparable study, that of Gatfield (2000: 32), used focus groups and in-depth interviews to study the issue of consumer satisfaction and quality of the university experience at an Australian University. Together with a literature review, this triangulation approach yielded valuable findings in student perceptions and provided the researcher with a tested and validated scale for measuring educational quality perceptions. The identification in this study, of perceived quality variables, relates closely too to one of the objectives of this study, viz. the identification of the attributes of a "successful" horticulturist. These were investigated in phases two and three. However, the importance of identifying those attributes that are important to employers was realised in the first phase. These relate to skills and

competencies of an entrant to the profession, but also to his or her "employability". The latter attributes may be considered as life skills, e.g. reliability, honesty and communication.

3.4.1.2 Issues of reliability and validity in using personal interviews

As was stated in Paragraph 3.3.2 above, rather than measuring qualitative research with the same criteria as are used with quantitative research, qualitative research is best evaluated by three terms with comparable meaning, viz. trustworthiness, accountability and auditibility. In order that qualitative research not be labelled a "soft option", researchers are obliged to "scientifically " account for their methodological principles. This may be best achieved by observing the criteria (see Paragraph 3.3.2) listed by Lincoln and Guba (1985, quoted in Decrop 1999: 158), viz. credibility, transferability, dependability and confirmability.

Niemann *et al.* (2000: 284) state that the absence of random errors lies at the centre of methodological reliability and that various measures should be applied to eliminate the occurrence of errors. Dependability (or reliability) in using personal interviews was assured by the triangulation construct of the research whereby the collection of data was crosschecked. In using all three techniques in the collection of data, the researcher endeavoured to evaluate their comparability and this was confirmed in all cases where similar questions were posed in two or more of the techniques used. Using member checks, i.e. where a selected number of interviewees were asked to corroborate the summated results to which they were party, served to further confirm the findings and in certain cases to further elucidate these. Where a number of minor errors were identified, these were corrected. All raw data as well as computed data and the researcher's notes have been preserved should it be necessary for this researcher (or another) to audit the data for any reason. Much of this data has been stored on audiotape or on computer disk. External reliability has been ensured by the exposition of the theoretical arguments for selecting the personal interview as technique and by the "thick" description and motivation of the methodology applied to the technique. This has been explained in this chapter as well as in Chapter 5.

As for reliability, content and concept validity were ensured by the preparation of a comprehensive register of data, notes of relevant actions or events, theoretical and methodological memoranda and categories of data used during data analysis. Crosschecking served to guard that the researcher did not influence the participants by his bias, influences and prejudices. Logical validity is related to the logic of the research framework and was

achieved by gathering data until the point of *theoretical saturation* had been reached. The process of data collection was terminated at 25 interviews when no new affirmative or contrasting information was obtained. In ensuring that external validity was maintained, the researcher fully described the research process, including the reasons for the choice of methods and the circumstances and context of the research. This has facilitated peer review.

The exclusion of interviewer bias was assured by concerted efforts at guarding for bias. The researcher's personal background is not dissimilar to that of many of the interviewees utilised in the personal interviews and bias could have occurred where the researcher was tempted to pre-empt the responses or to seek his own personal objectives. This realisation was made early on in the research and the researcher purposely used a reflexive approach in selecting interviewees, in the design and utilisation of an interview schedule and in the selection of interviewees for "member-checks". Wherever possible, the researcher requested assistance from impartial practitioners in each of the steps of the interview process, e.g. "Who would you think is best able to represent the arboricultural sector of the industry?" In following a qualitative research approach, the researcher attempted to interpret the meanings and experiences of the interviewees from within his own subjectivity, i.e. "wearing the shoes" of the researched.

3.4.1.3 Research process

The research comprised 25 interviews with selected practitioners within the Western Cape horticulture industry. The sample size was not pre-determined but after the total of 25 was reached, the process was exhausted and as nothing substantial was being added to that already collected, interviews were terminated. All interviews were held over a period of five months from November 1999 to April 2000. No attempt was made for practical reasons to include industry members from elsewhere in the country as the national nature of the qualifications and their applicability to all regions indicated that this selection was adequate.

The selection of interviewees was based upon their experience in the field of horticulture, most having in excess of 10 years' experience. Interviewees were also selected so that the seven identified sectors were represented. The researcher was careful in the selection of interviewees to not only select "key informants". Marsden *et al.* (1994: 135-136) warns that individuals of this type are often full of insight and while they may have a good overview of the topics under discussion, they may colour their responses with their own biases and opinions.

They may also not be representative of the community under discussion. Interviews were held by appointment in the interviewee's office, each interview lasting for approximately 40 minutes. The interviews were semi-structured and use was made of an interview schedule that comprised both closed and open-ended questions. Where interviewees indicated a lack of time, they were asked to complete the schedule as a self-administered questionnaire. These were returned to the researcher by mail or fax.

Following analysis of the results of the personal interviews and the preparation of a summary of the findings, five of the original interviewees were selected based upon their experience and for their knowledge of the industry and were asked to corroborate the findings (i.e. "Do these fairly represent your opinions on the issues in question?"). This procedure served to improve external validity and lessen any bias the researcher may have had in reporting the results. Comments received on the findings were incorporated into the findings.

3.4.1.4 Interview procedure

The interview schedule is listed in its entirety as Appendix 3.1 and all questions are listed for convenience in Table 3.1. A total of 12 questions related to the interviewee's personal, professional and employment details. Questions 9 to 11 asked interviewees to make a list on an attached sheet of all the skills that they expected of a horticulturist with a three-year national diploma in any one of the three directions. Respondents were then asked to indicate on adjacent columns which of these were inadequately provided for in technikon training in SA and also to motivate why they answered as they did. The rest of the professional and employment questions asked the interviewees to comment on a curriculum for the incorporation of SAQA's "critical outcomes", to comment on challenges facing the horticulture industry in the next five to10 years, to specify what problems he/she saw in the education and training of all levels of staff in the horticulture industry and lastly to evaluate the structure of professional horticulture in SA. Allowance was also made for other comments.

The second phase of the research, that using focus group interviews, will be discussed in the following paragraphs.

3.4.2 Phase 2: Focus group interviews

The researcher's motivation for selecting focus groups as a second qualitative technique will

be discussed below, followed by a discussion on the reliability and validity of using focus group interviews. These discussions will reflect upon the theory of these issues as well as their application to this study. As this technique will be responsible for a large component of the data to be collected in this study, methodological issues will subsequently be discussed and this will be done in considerable detail.

TABLE 3.1: INTERVIEW SCHEDULE FOR PERSONAL INTERVIEWS

1. Name
2. Address
3. Tel. No., Fax No. and E-MAIL
4. Please list your qualifications
5. Where employed (and position)?
6. Nature of company's business?
7. How long have you worked in this sector of the trade?
8. What other sectors have you worked in?
9. Please make a list on the attached Annexure A of all **skills/competencies** which you expect of a horticulturist with a 3 year national diploma (includes Landscape Technology and Open Space and Recreation Management).
10. Please indicate also on Annexure A which of these **skills/competencies** are inadequately provided for in technikon training in South Africa.
11. Please use column 3 of Annexure A (see column 2) to motivate why you answered as you did in question 10.
12. Does you company provide structured **in-service training**?

12.1 If yes, to which levels: Management, Supervisory or Craft and labour?

12.2 Please specify the training to: Management, Supervisory or Craft and labour.

12.3 Who provides the training? Management, Supervisory or Craft and labour?

13. Regarding the **NQF (National Qualifications Framework)**, do you consider yourself: well informed, reasonably informed or poorly informed?
14. Please study the **"critical outcomes"** on Annexure B (SAQA). These are to be incorporated into all qualifications. Please help us identify how you think they may best be learnt by learners (either at technikon or during in-service training)?
15. Please specify the **challenges** you see facing the horticulture industry in the next 5 - 10 years.
16. Please evaluate the **structure of professional horticulture** in SA (in terms of its representativeness in professional and other bodies).
17. Please specify (with a short motivation) what **problems** you see in the education and training on all levels of staff in the horticulture industry.
18. Please add any other **comments** you may wish.

3.4.2.1 Motivation for using focus group interviews

Vaughn, Schumm and Sinagub (1996: 3) credit Robert Merton to have been the first to use the focus group interview. Merton had been asked during the years of World War 2 what the public's response was to several radio war morale programmes. Merton (1987: 555) used the focus group for several other projects and developed the technique to the point where he could say that focus groups are "...a set of procedures for the collection and analysis of qualitative data that may help us gain an enlarged sociological and psychological understanding in whatsoever sphere of human experience". The "focused interview" developed as a reaction to the traditional individual interview, which used a predetermined questionnaire with its typical closed-ended questions (Krueger 1988: 19). The open-ended approaches followed in the focus group interviews allowed for meaningful interaction between the participants and the interviewer. This non-directive approach has several advantages.

Krueger (1988: 23-26) lists the promotion of self-disclosure as one of the most important advantages as participants are placed in a non-threatening and permissive environment in which they are encouraged to divulge their emotions, their opinions and their ideas. He states that commonality between participants is important in fostering self-disclosure and that participants should be relatively homogenous.

Vaughn *et al.* (1996: 14-20) offer five reasons for using focus groups. These are listed below and discussed in the paragraph following:

- Focus group interviews offer variety and versatility to both qualitative and quantitative research methods.
- Focus group interviews are compatible with the qualitative research paradigm.
- Focus group interviews offer opportunities for direct contact with subjects.
- The focus group format offers distinctive advantages for data collection.
- Focus group interviews offer utility.

The fact that focus group interviews can be used alone or with other methods, both qualitative and quantitative, relates to their versatility and their wide applicability also in educational research (Vaughn *et al.* 1996: 15). While focus group interviews have been used largely as exploratory marketing techniques, their use in education enables researchers to avoid educational planning by trial and error and in the words of Krueger (1986: 1-4, quoted in

Vaughn *et al.* 1996: 9), with reference to their use by agricultural education, the "magic box" of the focus group interviews facilitates planning and saves time and money.

As qualitative research instruments, focus group interviews study the diverse opinions and perspectives of participants in the phenomenological tradition and also recognise the interactive relationship between the moderator and the participants as adding depth and dimension to the knowledge gained (Vaughn *et al.* 1996: 15-16). In understanding the stakeholders in educational research, particularly in curriculum development, one is able to gain greater insight into problems by means of a direct, intensive encounter with key individuals.

The group format also promotes candour and participation as the focus group interviews occur in a relaxed group setting where participants sense that their opinions and experiences are valued. The group format stimulates greater participation, where the data gained is richer and fuller than data available from an individual interview (Lederman 1990: 117-127, quoted in Vaughn *et al.* 1996: 19).

Vaughn *et al.* (1996: 20) state that focus group interviews are useful in initiating programme development in education because of their quick turnaround time in data collection, particularly compared to a survey instrument.

The inability to generalise from focus groups is the major canard directed against the use of focus group interviews (McQuarrie and McIntyre 1987: 58-59). These authors state that focus group interviews cannot perform this function with any reliability, but that they do focus consumer response by moving individual responses to a "centre of gravity". It is further contested that while this is what focus group interviews purport to do, generalisation is an "illegitimate research objective for focus groups" (McQuarrie and McIntyre 1987: 59).

In their study of the atmosphere created by focus group interviews, Bristol and Fern (1996) compared focus group interviews with the nominal group technique and self-administered open-ended surveys. The authors (Bristol & Fern 1996: 193) state that focus group interviews "...seem to create an atmosphere of excitement, relative nervousness and arousal amongst the participants in the interview". Furthermore they note that focus group interviews appear best suited to creating an atmosphere conductive to phenomenological and exploratory tasks and not for gaining clinical types of output.

The implications of selecting focus group interviews for this research study mean that the researcher will be able to study at depth the opinions and attitudes of the participants. These findings will have evolved from a collegial debate between industry members of largely the same cohort, qualifications and experience. The participants will be well prepared for the interviews because of the questionnaire submitted to them prior to the meetings. The importance of participants within the seven sectors of the horticulture industry deliberating on curricula issues is essential to the formulation of a situational analysis which will inform the development of a revised curriculum for horticulture. The selection of participants, the number of focus groups, the identification of a suitable venue, appropriate dates and times and the recording of meetings were all carefully considered.

3.4.2.2 Issues of reliability and validity in using focus group interviews

Reliability in focus group research relates to the extent to which the instrument of research administered by different people will produce equivalent results (Diers 1979, quoted in Nyamathi & Shuler 1990: 1284). Nyamathi and Shuler (1990: 1284) state that qualitative research emphasises the uniqueness of human experience and that repeatability (or reliability) should be replaced by the criterion of auditibility. Sandelowski (1986: 27-37, quoted in Nyamathi & Shuler 1990: 1284) states that this relates to the condition in which another researcher can clearly follow the analysis pattern used by the researcher in the study. The process followed by the researcher in undertaking focus group interviews can be clearly traced in this chapter as well as in Chapter 5.

Auditibility in this research study can also be followed by studying the taped proceedings, the transcripts (where done), the researcher's notes as well as the questionnaires completed by the participants. The researcher was also the single moderator throughout the different focus group meetings and every effort was made to ensure that moderator procedures remained as similar as possible. Morgan (1993: 231) states that while a level of standardisation is important in ensuring reliability, a narrow goal of consistency would also restrict the dynamics of individual groups. The researcher was acutely aware of the interpersonal dynamics at different focus groups and particularly because his role was that of moderator and not chairperson, he endeavoured to ensure that all group meetings were run with the same degree of (moderated) guidance. A preferred description of the role of the moderator/researcher would be that of facilitator.

The internal reliability of the three techniques used in this study is heightened by the triangulation of methodologies, e.g. method triangulation whereby the personal interview technique was followed by focus group interviews and this by a mail questionnaire as three separate measures to crosscheck the collection of data from the same source. The researcher undertook an analysis of the relevant literature prior to this method being applied, which served to identify the characteristics of focus group interviews. It also reduced considerably the likelihood of casual misinterpretations infiltrating the findings. The preservation of all information regarding the research, i.e. raw data, computed data and notes, as well as the recording of interviews on audio-tapes and the storage of computer data on disk, facilitates the verification of the methodology by independent persons. The researcher was assisted by three research assistants while undertaking the research and each of these persons was carefully selected for their responsibility and aptitude and thoroughly trained so that they were competent to assist.

External reliability is ensured by a "thick" description or exposition of the methodology followed, the selection of interviewees, the interviewing process, the use of a questionnaire prior to the meetings, the recording of proceedings and other arrangements. In declaring the finer details of the research process, by motivating the theoretical assumptions and explaining the sequential development of the process, the researcher has endeavoured to ensure that the research would be replicable by another researcher.

Nyamathi and Shuker (1990: 1284) state that "validity refers to the degree to which a procedure really measures what it proposes to measure" and also that "... focus group interviews have high face validity, due to the credibility of the comments from participants". Evaluating this statement, Reed and Payton (1997: 770) contend that to say that focus groups present facts about the real world external to the focus group interviews is mistaken. Rather, they argue "... what a focus group reflects is the process of developing a group perspective or position amongst a particular set of people". Participants come to a focus group with particular ideas and processes that they have developed previously. The uniqueness of the outcome of each focus group is related to its own group identity and its validity or credibility lies in its honesty and its trustworthiness. The replication of focus group interviews within homogenous groups, as was done in this study, increases the credibility of the composite outcome of several focus groups.

The full or "thick" exposition referred to above also ensures that the internal validity of the research has been heightened. This was particularly facilitated by the following: the preparation of a comprehensive register of data, notes of the proceedings (kept independently by the researcher and his assistant), notes kept by the researcher of all arrangements, the questionnaires completed by interviewees, recordings on audiotape and storage on computer disk of all raw data. Having at least two or more focus groups per sector (except for two sectors where one meeting per sector was arranged) ensured crosschecking. The researcher also arranged for debriefing with each focus group, whereby two or three participants were contacted telephonically after the meetings for their personal evaluation of the success of the meetings. Where logistical and other procedural points were made, the researcher was able to correct these before the next focus group meeting. One of the questions posed by the researcher related to his role as moderator and was aimed at identifying whether the researcher was influencing the participants in any way by his possible bias and/or prejudices as these may have affected participant responses. The participants who were questioned raised no concerns of this nature.

Gathering data until the point of theoretical saturation had been reached ensured logical validity, which relates to the logic of the research framework. This point was reached at different points by the various focus groups. With the more extensive Landscape and Amenity Horticulture sectors, three meetings each were required. The Arboriculture and Floriculture sectors are relatively small and one meeting each appeared to be adequate in answering all of the required questions. The researcher strived in all discussions to ensure that the systematic collection of data from participants did not spoil the principle of "letting the participants speak for themselves". The free flow of the debates was actively encouraged up to a point where the researcher felt that either the topic was changing or where he felt it important to consolidate the discussions by way of summation.

In fully and accurately describing the research process, including the reasons for the choice of methods and the circumstances and context of the research, external validity was also ensured. The premise followed was that peers should be able to evaluate the validity of the research.

As stated in Paragraph 3.3.2.3, objectivity in qualitative research is only possible if the object (i.e. the researched) has been "listened to" and when there has been a "full turning towards the object". The possibility in focus group interviewing of permitting researcher bias to enter

the process is a real one and in this study was warded off by the researcher's concerted efforts at self-reflection. The debriefing exercise whereby the researcher discussed his role as moderator and any possible bias with selected participants as well as with his research assistant, served the useful purpose of "bouncing" the outcome off other neutral parties. It is in assuming the subjective role of the researched that the researcher is able to view the topics under discussion in an "objective" or non-subjective manner.

3.4.2.3 Selection of participants

It is recommended (Vaughn *et. al.* 1996: 62) that in the selection of participants for focus groups, participants should generally be selected to be as homogenous as possible in terms of background, demographics and sociocultural characteristics. The importance of this point is understandable where focus groups will be studying sensitive issues and/ or issues which primarily affect particular populations. In this study, homogeneity in employment within one of the seven sectors was the only primary criterion for selection. Participants had to be either formally qualified in that specific sector or had to have had a number of years of experience in that sector. The horticulture industry in the Western Cape is not a large one and has approximately 400 - 500 qualified horticulturists who are actively employed in the industry. Most of these persons are known to the researcher and in selecting participants, he attempted to retain as much homogeneity within the seven sectors in terms of demographics, educational background and years of experience as possible. This purposive sampling included the preparation of a list in consultation with leaders in each sector of likely candidates for each sector and the selection of those who would be able to make the greatest contribution to the discussions. Heterogeneity in practical experience and exposure to the different aspects of individual sectors was a primary consideration.

Where more than one focus group per sector was instituted, an attempt was made to subdivide the participants into separate focus groups depending upon whether they had obtained a qualification (or were experienced) prior to 1990 or after 1990. Vaughn *et al.* (1996: 63) recommend that greater participation is ensured where participants do not have great age differences. The greater ease of interaction between age cohorts was noted particularly where they were on parallel levels in their respective companies/institutions, had similar work problems and had comparable qualifications in horticulture. This subdivision was not always strictly adhered to because of a number of requests by participants to be placed in another group because of other engagements on the original date. As it transpired, no

problems in terms of interactivity during focus group interviews were noted. This was put down to the non-sensitivity of the research objectives (compared to other focus group applications) and also to the collegiality that quickly developed between participants.

As the goals set for the interviews were primarily educational, the decision to conduct mixed-gender interviews related to the professional standing of participants. Persons of both gender hold comparable positions in industry and were therefore treated as equal.

Vaughn *et al.* (1996: 63-64) also recommend that participants should not be known to one another as this brings to the focus group interviews interpersonal dynamics (e.g. feelings of intimidation, clique-forming) which could detract from the full participation of all participants. In the selection of participants, an effort was made to invite participants from different companies, institutions or professional bodies, although invariably, several participants were known to one another, having studied together or having worked together on joint projects or having served on one or more professional institutions or other bodies. The researcher was particularly sensitive to the possible negative effects of participants knowing one another and in seat-placing and other measures, for example, endeavoured to ensure that friends did not sit next to one another or that participants did not form sub-groups within the larger meeting. All participants, particularly quieter individuals, were drawn into discussions and as mentioned above, the collegiality represented by a common profession and the opportunity to discuss issues important to both the individuals and their companies/institutions led to a positive rapport between the researcher and the participants and between the individual participants. It was notable that participants were genuinely excited about the opportunity to air their views and to play a positive role in the revision of their own qualification. Members of two trade unions were also invited and were in attendance at two focus group meetings. Both had in excess of 10 years' experience (no qualifications) in their particular sector. Both individuals participated actively in their respective meetings.

3.4.2.4 Number of focus groups

As mentioned above, the decision to hold three focus group interviews for the Landscape and the Amenity horticulture sectors was based on the size of their respective professional bodies. Two focus group meetings were held for each of the Nursery retail, Nursery production and Turf sectors and one each for the Arboriculture and Floriculture sectors. The latter two sectors have few members in the Western Cape. The Arboricultural sector in fact has only

recently established a professional body.

Morgan (1997: 43) recommends that the ideal number of focus groups per research project is normally three to five, depending upon the extent to which one obtains new information with any additional focus group interviews. Morgan (1997: 43) states that the goal is "saturation" and that this term used by Glaser and Strauss (1967) refers to that point at which additional data collection no longer generates new understanding. The decision to hold 14 focus group meetings and to limit the numbers of focus group meetings per sector as specified above and not to hold three to five focus group interviews per sector, was based upon the following criteria. The first is that the focus group interview component of this study was to be seen as an intermediate stage where preliminary data would be collected which could be tested during the national mail questionnaire survey to follow it. Vaughn *et al.* (1996: 48) state that in an exploratory study, one or two focus groups would be sufficient. The second is that considerable overlap exists between the seven sectors in terms of background knowledge, fields of learning and specific competencies/skills. Morgan (1997: 43) refers to the variability of the participants and concludes that where greater homogeneity exists, fewer groups would be required. A further criterion in support of fewer groups (Morgan 1997: 44) is that where the focus group interviews are more structured and the moderator has a higher level of involvement, fewer groups would be required (as was the case in this study). Field (2000: 328) reports that in his study of human resource responsibilities in a number of matched sectors (as was also the case in this study), 10 focus groups were conducted and that the groups were sectorally based. Four sectors had two focus groups each, while two sectors had one focus group each.

3.4.2.5 Number of participants per focus group

It is recommended by Morgan (1997: 43) that focus groups comprise of no fewer than six participants and no more than 10. In fewer than six, interaction is limited due to the smaller pool of background knowledge/experience and in focus groups with more than 10 participants, control is difficult and individual participation is limited due to the many participants. In this study, during intense debates, this was certainly noted to be true and the researcher was compelled to make sure that order was maintained and that everyone was given an opportunity to participate. Wilson (1997: 216) recommends the use of small, moderated groups of acquaintances where the purpose is to understand and interpret the respondent's experiences. The ideal number was found to be between six and eight

participants.

Focus groups in this study were also selected with a comparable focus to that mentioned above. The number of participants varied from two to 11, most being between five and eight. The latter were found to be ideal. In the case of the focus group with two participants, both participants had an extensive background and greater delving was possible. In the focus group with 11participants, much stricter moderator control was required. Larger groups were mostly the result of additional participants arriving where they had their dates mixed up or where in one case, a colleague of an invited participant arrived uninvited. The researcher decided not to disallow anyone entrance, as this would have created ill feelings and a negative atmosphere.

3.4.2.6 Invitation to participants

Invitations to participants were faxed or posted to individuals at least three to four weeks prior to focus group meetings. In most cases this appeared to be a timeous warning. These invitations took place in all cases only after a personal invitation by the researcher. The letter of invitation (see Appendix 3.2) provided the potential participant with a motivation as to why his/her participation was important as well as the date, time and venue of the meeting.

As mentioned above a questionnaire was also attached and participants were requested to complete this with due consideration and to bring it with on the day of the focus group meeting. Either the researcher or his assistant issued a further telephonic reminder between three to five days prior to the meeting. These personal contacts contributed significantly in ensuring that those invited did attend the focus group meetings.

The response to the invitations was in general positive. Of the approximately 140 invitations directed to potential participants, 96 individuals responded and attended. The primary reason for not being able to attend was that the individuals had other commitments on the day in question. In this case, an alternative individual was contacted. It was later reported that Fridays were not favoured for meetings of this nature and that meetings should rather be held on other weekdays.

All focus group meetings were held between 12:30 and 15:30, which meant that participants were able to attend to their normal duties during the morning, and again in the late afternoon. This time slot appeared to suit the majority of participants.

Certain participants at the earlier focus group meetings complained that they had found the venue with some difficulty (and subsequently arrived late). A map of the campus with clearer directions to the venue was then attached to the later invitations or faxed to those who were unsure of the location.

3.4.2.7 Duration of focus group meetings

Vaughn *et al.* (1996: 132) recommend that adult focus group interviews not exceed duration of 90 minutes, as participants are likely to lose interest beyond that length of time. In this study a duration of three hours was decided upon because of the number of questions the researcher wanted the participants to discuss. All participants were accordingly informed of this during the original telephonic request and again reminded in the letter of invitation. As all individuals arrived expecting to stay for three hours, no objections were made at the outset of the meeting when the researcher affirmed this, but stated that the conclusion would be at promptly 15:30 (starting time was 12:30).

A light lunch was served midway during the sessions and this further encouraged participants to stay for the duration. The researcher had also placed a clock and a programme (with times allocated to each question, see Appendix 3.3) in a position visible to all and this reassured everyone that it was to be a structured meeting with allocations to specific questions. As events transpired it was not always possible to stick to the time allocation. Despite this and a late start in two or three meetings, all meetings were punctually concluded as promised.

Participants were also encouraged to enjoy the experience of sharing their views with colleagues in the industry, to consider the time well spent and to regard it as an investment in their industry. All participants demonstrated a positive approach to the meetings. Of particular note was the fact that no-one complained about the length of the meetings.

3.4.2.8 Participation by participants and the concomitant role of the moderator

As mentioned above, the fact that all participants had a broad homogeneity in background,

i.e. all were either qualified or experienced in one of the horticultural sectors, led to a feeling of common purpose in the objective and the outcome of the focus group interviews.

The role of the moderator in using focus groups as a research method is one of facilitation (and not of acting as an interviewer) in ensuring participation is fluid and goal centered (Krueger 1988: 72). The control that is exercised over the proceedings is one of moderation, whereby no single individual dominates the deliberations, all persons are encouraged to participate, that debates remain within the researcher's "agenda" and are focused towards the resolution of the research problem (Krueger 1988: 73). The same author states that the focus group affords the opportunity for "multiple interactions" amongst all participants, i.e. including the moderator. The focus group should be seen as having a group discussion under the nurturing hand of the moderator, where he/she exercises mild, unobtrusive control over the group.

All focus group interviews were commenced with the researcher giving an overview of the research problem and an explanation of how their participation would assist in resolving this and would result in the institution of a revision of horticultural curricula, i.e. once consensus had been reached on the most appropriate training for each sector.

In this study, the researcher acted as moderator with the research assistant handling all logistical issues such as registration, tape recording, refreshments. The assistant was also responsible for identifying the persons speaking (especially in the first 10 minutes) so that these could be identified in later transcribing of the proceedings. The researcher experienced no problems in moderating the focus group interview meetings, having explained his role as well as the specific functioning of focus groups at the outset. In most focus groups it became necessary towards the latter half of the three-hour session to remind participants of the "ground rules", particularly that of only talking when no-one else was speaking and of directing themselves towards the microphone. This only happened because participants became "carried away", which in itself is not a negative issue but did create an amount of distortion on the tape recordings.

Participants were encouraged to speak freely and not to address the researcher but the meeting in general (as in informal conversation). They were also encouraged to speak in either English or Afrikaans, as they preferred. In two groups however, non-Afrikaans speaking participants were in attendance and these meetings were conducted in English only.

The researcher made use of an overhead projector (kept on a side-table adjacent to his seated position at the central table) for recording key issues under discussion and for ensuring participants did not forget what had already been mentioned. The overhead projector performed a useful role in the above regard and was an improvement to the researcher's use of a whiteboard at the first focus group meeting. A phenomenon noted with the latter was that as soon as the researcher stood up from the table to write on the board, discussions tapered off and all attention was focused on the "teacher and the board".

The spacing of the 14 focus group interviews over a period of close to a month meant that in most weeks only three or four meetings were scheduled. This provided the researcher with sufficient time between the meetings to recover from the past meeting and to prepare for the next. A programme of the 14 focus group meetings is attached as Appendix 3.4.

A valuable lesson learnt by the researcher in running focus groups and particularly useful to the research output of this study was the following procedure followed from the third to the fourteenth focus group interview:

Once all input in terms of skills/competencies within all fields of learning had been acquired by a particular focus group on its sector, participants were asked to individually place the four to 10 fields of learning which they had identified in priority sequence and to accord each a percentage ranking. The participants then aggregated these and a concluding priority ranking of the sector's fields of learning was established. This "product" of the day's deliberations was welcomed by the participants as their contribution to the research problem and its resolution and clearly heightened their sense of satisfaction with their participation. Marsden *et al.* (1994: 134) list this ranking method as an advantage of focus groups in that it allows the focus group to gain some degree of "collective approval". It enables the group to show its degree of consensus over a particular issue.

The primary advantage of focus group interviews as opposed to personal interviews is that participants are brought into a brainstorming situation where one idea generates another and where the group format promotes candour and participation (Vaughn *et al.* 1996: 19). Participants in these focus groups were all receptive to the opportunity to participate in an academic debate of this nature and the stimulation they received certainly bore fruit in the lively discussions.

Vaughn *et al.* (1996: 91) list 13 so-called moderator pitfalls that the moderator of a focus group needs to keep in mind. These vary from being too passive to too controlling, to treating participants' views unequally. The researcher, acting as moderator, was very aware of these "pitfalls", but in particular was careful not to introduce any bias that would influence the group. He endeavoured at all times to remain objective and to allow discussions to follow the content of the question under debate and not to introduce his personal beliefs, attitudes and expectations of the outcome.

3.4.2.9 Use of the questionnaire

Vaughn *et al.* (1996: 69) state that participants in focus group interviews should not be pre-informed of the matters to be discussed at the focus group meetings as this leads to participants arriving at the focus group meetings with preconceived ideas and subsequently a lack of spontaneity at the meeting may be experienced. Wilson (1997: 222) states that questionnaires administered either before or after a focus group are mutually contaminating and add little to the research process. This author requested participants to complete a short questionnaire at the end of each session. Morgan (1997: 57) states that a questionnaire, supplemental to transcript data, has both advantages and disadvantages. He also states that they are contaminating, however he too refers to the use of questionnaires after the focus group session has been concluded. He warns as well against making survey-like interpretations of the questionnaire data as the small size and non-representativeness of these are suspect. Kitzinger (1994: 118) states that the questionnaire used prior to the group discussion provided data on each participant's attitudes and beliefs, allowing for some comparison between initial, individual responses and later group responses. This author quotes Morgan (1988: 58) in saying that "the process of writing things down reinforces a person's commitment to contributing them to the group, even in the face of apparent disapproval".

The researcher's decision to use a questionnaire prior to the focus group interviews was based on the motivation (and followed discussions with Sociology researcher, J. Vorster, 31 January 2001) that a great deal more data would be available as questions not covered during the meetings would have been collected in the questionnaires. The content of the research questions was also not seen as being at all contentious and sensitive and therefore unlikely to be contaminated by the prior completion of a questionnaire. The questionnaire has

been recorded in full as Appendix 3.5 and all questions have been listed for convenience in Table 3.2.

TABLE 3.2: QUESTIONNAIRE FOR FOCUS GROUPS

1. Name in your opinion the most important **values** (eg. to conserve water) in the field of horticulture. Please rank the most important 5 of these in order of importance i.e. by noting 1 to 5 next to the respective values.
2. Name the most important **attributes or qualities** employers desire in a horticulturist. Please rank the most important 5 of these in order of importance i.e. 1 to 5 (as above).
3. Consider for a moment the **problems or challenges** which you regard as typical of your sector of horticulture (e.g. Floriculture). Please list as many as you can and rank the most important 5, again as was done above?
4. How has this sector of horticulture **changed** in the last 10 years? How do you expect it to change in the next 5 years?
5. To identify the **contextual framework** of this sector, please list briefly those key aspects which are special to and which define this sector of horticulture (e.g. sell plants or grow cut flowers)
6. Please identify the **overall skills** (also called core skills or competencies) which are typical of a horticulturist working in this sector of horticulture. (Please rank broadly so that you end up with about 7core skills e.g. propagate plants.)
7. Please identify say another 5 to 7 specific skills within each of the above core skills you have just listed. (**Hint:** number the core skills above say 1 to 7 and below fill in the **specific skills**, e.g. 1. Propagate plants, 1.1 sexual propagation, 1.2 vegetative propagation.)
8. Please consider all those aspects of the job that qualified **horticulturists struggle with** when they first start working (say in their first 5 years). Or put differently: "What are the skills you wish the Technikon had taught but got taken for granted?". Please rank these as before from 1 to 5.
9. Considering the above core skills, what **background knowledge** (e.g. botany, science, maths) do you think is important in being able to fully apply them?
10. What criteria do you think the Technikon should bear in mind in **selecting students** for this sector of horticulture? Please rank these again from 1 to 5.
11. Please indicate the number of **years** that you have spent in the different sectors.
12. Please use the space below to make any other **comments**.

In the researcher's experience participants who completed a questionnaire prior to the focus group interviews arrived fully prepared for a discussion on the various topics. This measure also provided the researcher with tangible feedback to his questions in addition to that which he was to obtain from the focus group meetings. Participants therefore had an opportunity to consider the issues and to formulate in writing their personal opinions. In a number of cases, participants submitted a three to five typed page report in addition to the completed questionnaire.

It is particularly the latter that the researcher found to be a useful outcome of his directing to all invited participants a comprehensive questionnaire on issues to be discussed. During the focus group meetings, the researcher asked individuals to inform the group of their opinion on a particular issue. This was often used to initiate a discussion on that topic and the individual in question was able to provide the meeting with his/her opinion based not upon an impromptu answer but on a well considered opinion. Furthermore, participants provided the researcher with a greater depth of information than could have been gathered otherwise by recording of verbal discussions only. In larger focus groups, especially those with more than seven participants, the questionnaires also provided data that may not otherwise have been captured.

A total of 96 individuals participated in the 14 focus group meetings and a total of 98 questionnaires were completed. Individuals who were for various reasons not able to attend submitted four of these questionnaires. This is an additional advantage of asking participants to complete a questionnaire, i.e. where he/she is not able to attend, the researcher still has his/her opinions on the issues to be discussed.

The completed questionnaires also provided the researcher with information on issues, which as a result of time constraints, could not be discussed at all (or in depth). More important issues were however prioritized by the researcher during the meetings and the above relates primarily to lesser issues. No meetings exceeded the three-hour time limit and the fact that questionnaires had already been completed enabled the researcher to conclude the meetings at the promised time.

3.4.2.10 Venue

Vaughn *et al.* (1996: 52-54) state that the creation of a physical environment which provides for an intimate and comfortable atmosphere, that facilitates members' willingness to disclose information, is essential to the success of focus group discussions. The same authors (Vaughn *et al.* 1996:53) list several other aspects relative to the venue, ranging from ample free parking to the size of the room. Every effort was made in this study to provide the best possible facilities, particularly because meetings were three hours long.

The venue selected for holding the focus group interviews was a seminar room in the Cape Technikon library. The Cape Technikon, situated in the Cape Town City area, yet within easy

access from the suburbs (and further afield) and with ample parking, was a central meeting place that suited all participants. The seminar room was block-booked for the duration of the 14 focus group meetings and could therefore be set up semi-permanently as regards placement of tables, chairs, overhead projector, tape recording apparatus, urn and clock. The room was fitted with a whiteboard. The seating arrangements were indicated to participants as they arrived by place markers, which listed each participant's name and organisation. The chair spacing was also such that participants were not distant from one another and the table small enough to create a feeling of closeness. The single microphone was placed in the centre of the table so that everyone was equally spaced from it.

The seminar room with its air conditioner and windows facing the Technikon campus gardens accorded participants a pleasant and relaxing environment. The provision of fresh fruit juices, teas and coffees (available on a self-help basis) and light refreshments further added to the amenable atmosphere. Many participants commented positively about the venue and the other logistic arrangements. These arrangements were particularly important because of the extreme heat experienced during February and March when the focus groups were held.

3.4.2.11 Recording of proceedings

Morgan (1993: 68) recommends that the proceedings of focus group interviews be tape recorded on audiotapes as an accurate record of proceedings, but also so that these may be transcribed if necessary. Morgan (1993: 68) states that video cameras do not add substantially to the quality of the focus group and may even be a distraction. The researcher decided against video recording the meetings for this reason and found that once participants had grown accustomed to the tape recording apparatus, they participated fully. Prior to the start of the meetings participants were asked whether they had any objection to the recordings being done. No objections were raised.

The researcher decided from the outset to make summary notes as a further record, but also as a moderator guide to himself during the meetings. These notes were made on a blank questionnaire under the specific question being discussed or alternatively on transparency slides which were written up on the overhead projector. The latter enabled the participants to see the points that had already been raised under the topic under discussion. This was a great help to the participants in ensuring that old ground was not being covered again and also in stimulating new thought.

All focus group meetings were successfully recorded except for one where a malfunction of the tape recorder occurred. Fortunately the researcher had made comprehensive notes, as neither he nor his research assistant was aware of the malfunction.

As mentioned above, most participants completed the questionnaire prior to the meetings and these also served as a record of each individual's opinions and comment on the topics covered.

A total of 26 (90 minutes each) audio cassettes were utilised and all recordings were successful except for the one malfunction and also a few where participants spoke simultaneously or spoke too softly. These were fortunately limited and no data was lost.

3.4.2.12 Procedure followed in analysis of data

The researcher utilised the completed questionnaires, his own notes, the overhead transparencies and the tape recordings of the focus group meetings in preparing summary sheets for each focus group meeting and subsequent to that, summary sheets for each sector.

Tabulated forms (see Appendix 3.6) were prepared prior to the analysis of data based upon the structure of the focus group interviews, which in turn were structured upon the questionnaires. In a process which took up to six hours per focus group meeting, the researcher was able to edit, make notes and code data as he listened to each tape, at the same time comparing these to his own notes and to the completed questionnaires. The tabulated forms were used as summary sheets for each focus group and represented a collation of all sources. In concurrence with Field (2000: 329), the researcher chose to analyse the data manually, partly on grounds of convenience and partly because he was not persuaded that software packages added a great deal. The experience of "being close to the raw data" was that this placed the researcher in a favourable position to understand individual and group meanings. It was also decided not to have all interviews transcribed, but to summarise these and to transcribe only those sections which were particularly useful in "direct monologue". Bertrand, Brown & Ward (1992: 201) state that the major disadvantage of transcription is the amount of time needed to complete the transcriptions. This author states that one hour of discussion on tape may take three to four hours to transcribe. As the

researcher had 42 hours of recordings, this was impractical due to time and cost restraints.

The methodology followed in undertaking focus group interviews has been fully discussed in the foregoing paragraphs. The third research technique, a mail self-administered questionnaire, will be discussed below. A similar sequence will be followed as was used in describing the methodology of the other two techniques.

3.4.3 Phase 3: Mail questionnaire

The reasons for utilising a mail questionnaire are firstly expounded, followed by a discussion of the reliability, validity and objectivity of this phase of the study. Methodological issues relating to the sample methodology and the questionnaire format are subsequently discussed. This section of the current chapter is concluded with an explanation of the evaluative technique termed "Importance-Performance Analysis" and a motivation for its incorporation in the questionnaire.

3.4.3.1 Motivation for using a mail questionnaire

The premise that research findings should be generalisable lies in the positivistic approach and while qualitative research does provide for greater in-depth understanding of phenomena, proponents of the triangulation approach would see quantitative and qualitative methodologies as complementing one another (Rossman & Wilson 1985: 633). In this study, a mail questionnaire based upon the foregoing qualitative methods has been used to expand the data, to verify some sets of data and to obtain greater generalisability.

A self-administered mail questionnaire was selected to gather the desired empirical data as it is a relatively cheap research technique and its prime advantage is the ability to obtain broad geographical coverage. The researcher's goal was to extend the research study from its focus in the Western Cape to a national level. This would mean that he would be able not only to corroborate the findings of the focus group interviews but also to ensure that the study gains generalisability across the country. The researcher believed that, not discounting the data collected using the qualitative methods, the empirical data gained from the self-administered questionnaire survey would address curriculum needs with greater clarity and broader understanding. The mail questionnaire was directed at the broad horticulture industry, at those either qualified or experienced in the industry, but who were knowledgeable on the

competencies of a horticulturist operating in one of the seven identified sectors.

The focus groups identified sector-specific skills within seven to 10 fields of learning per sector and these were to be corroborated and/or adjusted based upon the wider audience. A typical question asked respondents to place a value to selected attributes deemed by the focus groups to be critical to success as a horticulturist. These and other questions were aimed at gaining greater understanding of the role of the horticulturist within his/her specific sector. The questionnaire was relatively long and required careful consideration in completing. As a self-administered questionnaire, it could however be completed at the respondent's leisure. A telephonic interview survey was discarded as an alternative research technique for the above reasons, which would have made it impractical and too costly.

3.4.3.2 Issues of reliability and validity in using a mail survey

Quantitative research is aimed *inter alia* at being able to make inferences to a broader population. Inferences should be justifiable and defendable (in the positivistic paradigm) and research following the quantitative approach should be reliable, valid and objective.

As was stated in Paragraph 3.3.1.1 above, the core meaning of methodological reliability is the absence of random errors and the maintenance of accuracy, stability, consistency and repeatability of the research. This implies that operating under the same methodological conditions, another researcher should conclude his/her research with the same results. The development of the self-administered questionnaire in this study was based directly upon the results of the two qualitative techniques. Many of the questions used in the mail survey were based on questions that had been tried and tested in the two foregoing techniques. Both the personal interviews and the focus group interviews led to an array of questions that could all have been extended to a national survey level. The researcher was compelled to limit these to the most important only. Their inclusion in the mail survey was therefore based upon careful deliberation and their direct contribution to the goals of the study. A total of 35 trial questionnaires were circulated to a selected number of lecturers at each of the technikons offering horticultural programmes as well as to a selected number of practitioners. A total of 21 questionnaires were returned. As a result of the proposals made by the above persons, the questionnaire was shortened by four questions, the terminology was simplified and part of the instructions to respondents was clarified.

Every effort was made in constructing the questionnaire to ensure that none of the questions were of a leading or "motherhood" nature and that they did measure what they were supposed to measure. The questionnaire was discussed in its pre-test format as well as in its final format with a researcher at the Faculty of Education, University of Stellenbosch, who was asked to study it and to suggest changes to the structure of both the questions and the questionnaire (Carl 2001: Personal discussions, 10 May). Certain questions were discarded and others were adapted before it was circulated. The response rate and the sample size will be discussed in the following paragraphs and the justification for their acceptance will be motivated. With all of the above measures provided for, the researcher was confident that the mail questionnaire as a quantitative research technique, was in content and in process, a reliable and valid measuring instrument for the research being undertaken.

The foregoing qualitative techniques, i.e. the personal interviews and focus group interviews, provided the researcher with a rich database upon which he was able to construct the self-administered questionnaire. It was therefore possible to construct the questionnaire largely using closed-ended questions. The assumptions and the inferences made from the mail survey were based upon ordinal-type data and this together with the data gained from the qualitative research methods was well suited to the descriptive nature of this study. Johnson and Christensen (2000: 209) describe descriptive validity as the factual accuracy of the account as reported by the researchers. The factual accuracy of all accounts of the methodology was ensured in the maintenance of written notes and audiotaped records of the procedures followed. This was seen as being central to the validity (and the reliability) of the study, particularly because the objective of this study is to describe the situational analysis in curriculum development in horticulture. Descriptive validity is therefore seen as being essential to the scientific validation of the research.

In accordance with Niemann *et al.* (2000: 284), who state that quantitative researchers should be able to separate themselves from their research in order to be able to operate in a totally unbiased, value-free and impartial manner, this researcher endeavoured to keep himself at a distance from the research process throughout this phase. Using the premise (Crompton 1985: 91) that if bias has been discounted, the research process fully explained and any inconsistencies in measurement honestly exposed, the researcher believes that he is able to declare that the survey has been reliably executed.

Methodological issues relating to the use of a self-administered questionnaire as a mail

survey instrument and applied to this study will be discussed in the paragraphs below. The sample methodology will firstly be described and thereafter the format of the questionnaire. The evaluation technique of Importance-Performance Analysis will also be explained as it is to be applied to this study.

3.4.3.3 Sample methodology

The following aspects of the sample methodology will be described in the following paragraphs: sample unit, sampling methodology, population, population size, sampling frame and the response rate.

3.4.3.3.1 Sample unit

The ideal respondent to this survey was a practising horticulturist as he/she would be familiar with the content of his/her particular job. If this person had been working in that particular sector for a number of years, had changed jobs within that sector or had moved up in the hierarchy of the company/institution, he/she would be able to respond to the questionnaire with even greater authority and was eminently suited to respond. Even those horticulturists who had worked in more than one sector were seen to be ideal respondents as they would have had broader exposure than those limited to one sector and particularly to one job. Despite the foregoing, it was difficult to identify respondents on this basis as no comprehensive list of horticulturists exists in South Africa, especially one delimited according to work experience.

The only criterion set for respondents was that they should be either qualified as horticulturists (in any of the relevant sectors) or that they be sufficiently experienced to be classified as a "practising horticulturist". The latter was difficult to define in terms of relevancy and aptitude. Should a "practising horticulturist" believe that he/she was a competent horticulturist, his/her *bona fides* were accepted in completing the questionnaire. Many older and unqualified horticulturists throughout the country are very experienced and knowledgeable and are held in high esteem by their colleagues.

3.4.3.3.2 Sampling methodology

A systematic random sampling methodology was utilised whereby the first person on each list

of professional members was selected at random and every second member thereafter was included. The listing of members on the lists of professional and industry members was on an alphabetical basis and as the survey was to include every second member and no bias could be identified, systematic random sampling was selected as the most appropriate and practical sampling methodology.

3.4.3.3.3 Population, population size and sampling frame

The population size of qualified and practising horticulturists is not known because no general register is maintained as elsewhere in the world (compare UK Institute of Horticulture). Table 3.3 lists the 12 professional and industry bodies with their number of members, which were identified as representing the horticulture industry.

TABLE 3.3: MEMBERSHIP NUMBERS OF PROFESSIONAL AND INDUSTRY BODIES IN SOUTH AFRICA

Professional and industry members	Number of members
CGF (Cape Greening Forum)	111
TASA (Turf Association of South Africa)	66
WPTA (Western Province Turfgrass Association)	130
SANA (South Africa Nurseryman's Association)	283
SALI (South African Landscape Institute)(Kwazulu-Natal)	35
SALI (South African Landscape Institute)(Gauteng)	138
SALI (South African Landscape Institute)(Western Cape)	56
LIA (Landscape Irrigation Association)	113
IPSA (Interior Plantscapers South Africa)	67
ILASA (Institute of Landscape Architects of South Africa)	113
IERM (Institute of Environment and Recreation Management)	300
Arboricultural Society	30
SAFGA (South African Flower Growers' Association)	55
TOTAL	**1497**

Many of the members represented on the above are corporate members, i.e. employers representing between a few and many horticulturists. Some of the latter may be members while their employers are also members. Some horticulturists are members of two or three professional and/or industry bodies. Professional bodies are regarded as those where professional qualifications are a prerequisite to membership (e.g. ILASA) and industry bodies

as those where professional qualifications are not a prerequisite (e.g. SANA). The latter may even include members who are salespersons in related industries (e.g. mower and small equipment suppliers).

Mouton (1996: 135) states that defining the population is a two step process, the first being the identification of the target population, the second the construction of the sampling frame. As stated above, the target in this study are all horticulturists in the country, whether formally qualified or practising on the basis of experience. Despite what was said in Paragraph 3.4.3.3.1 above, the sample unit for practical purposes is a company or institution employing one or more horticulturists. The sampling frame therefore comprises a list of all professional horticultural and industry bodies in SA (as per Table 3.3), i.e. whether these members are individuals or companies. A respondent could be an individual member or a "collective member", i.e. in the latter case a response received from a company or institution employing several horticulturists and the response representing a collective opinion. This could be because the company or institution operates in one sector of the industry and all horticulturists perform similar operations. Where the company or institution operates in more than one sector, a separate response for each of these was requested. Corporate respondents were therefore asked to complete at least one questionnaire for each sector or operation. As the population size was not known prior to the survey, respondents were asked to indicate how many horticulturists worked in separate divisions, therefore an estimated population size was expected to become known at the conclusion to the survey.

The size of the population within each of the seven sectors was also not known and could only be estimated from the number of members of the different professional and industry bodies. As many members operate in more than one sector, the decision was made not to try to identify sector populations and also therefore not to sample each separately by applying a stratified random methodology.

Bouwer and Schoeman (1988: 21) state that the sample size depends on practicalities such as time and funds, the heterogeneity of the population, the degree of reliability required by the research and the method of sampling (i.e. simple random, systematic, stratified and cluster sampling as opposed to quota sampling). While time and funds were limiting factors, the submission of survey questionnaires to 50% of all members of professional and industry bodies using a systematic sampling methodology was considered an adequate measure to ensure that the sample size was representative of the population. The goal set by the

researcher rested upon the postulation that if a questionnaire was sent to 750 members of the industry (total industry members 1497) and if 300 questionnaires were returned (giving a response rate of 40%), an adequate sample would have been gathered at a 0.05 confidence level (Krejecie & Morgan 1970: 608, quoted in Johnson & Christensen 2000: 178).

3.4.3.3.4 Response rate

A total of 1 100 questionnaires were distributed, primarily by mail, but also by e-mail and fax to the universe of 750 industry members. Many of these were re-submissions, either by mail or fax where respondents requested a new copy of the questionnaire.

A total of 171 questionnaires were returned from the universe of 750, giving a response rate of 23%. This was less than was hoped for but considering that Crompton (1985: 75) states that a response rate of 30% or lower is not unusual in mail questionnaires, this is regarded to be not inadequate. The length of the questionnaire at eight pages, the many reflective questions and the response time of between 30 - 60 minutes further added to the lower response rate. A total of 96 undeliverable mail returns were received, all marked "address changed" or "not known". An on-going record was kept of all respondents as they returned their questionnaires and on three dates following the original submission, reminders were sent to outstanding addresses. These led to an immediate telephonic response from many respondents who said that they had not received a questionnaire and asked us to send them one. Many of these were faxed to respondents. The response from these respondents was an improvement on the original batch dispatched. The many non-horticultural members listed on the membership list, i.e. commercial agents and publishing houses who received questionnaires but who either did not respond or returned a nil return, were also responsible for a lowering of the response rate. It was not known which of these did in fact employ a horticulturist and therefore they were included, as they had been randomly selected as part of the survey. It should also be borne in mind that the mail questionnaire was used as complementary to the focus group interviews and as it was not a stand-alone research technique, the response rate is considered to be adequate and representative.

Special mention needs to be made of the e-mail response rate. Of the original 400 questionnaires submitted by e-mail, only 10 were returned completed. A total of 20 were returned with mailer problems because the e-mail address was incorrect or had changed. Weible and Wallace (1998: 24) mention the following as reasons for a low response made for

e-mail questionnaires: bad addresses, difficulty of using incentives, difficulty in using technology and unsophisticated populations. Many computer users would not be prepared to spend the time in completing the questionnaire (may be time consuming, particularly if he/she is unfamiliar with technology). It may be this user, but also the "busy" user (i.e. those who receive a lot of "junk mail") who would simply "click and delete" (Litvin & Kar 2001: 313).

It is not known what the primary reason would be amongst horticulturists for not responding by e-mail. All of the above are probably relevant, however the single most probable reason, confirmed by random telephonic enquiry, was that respondents did not have the time. Other reasons given were that they had seen the e-mail but had forgotten to complete the questionnaire. Others said that they are unfamiliar with the Internet. Due to the low rate from e-mail submissions, mail questionnaires were accordingly sent to all the outstanding addresses.

The above clearly indicates that the reasons for non-response are not connected in any way to the topic of research, thereby identifying that no bias towards the research *per se* is indicated.

3.4.3.4 Questionnaire format

At the outset, the researcher realised that he would have to deal with the problem of a long questionnaire because the mail questionnaire was being used to corroborate the findings of the focus groups. The latter had addressed three specific and central issues that the researcher wished to have confirmed. The discussion below addresses the design, construction and other relevant matters of the questionnaire (see Appendix 3.7 for full exposition and Table 3.4 for a listing of all questions):

3.4.3.4.1 Length

The questionnaire was limited to 14 questions (see Table 3.4), which when translated into Afrikaans meant that it was 32 pages long. These were of A4 format size and when reduced to A5, the full questionnaire was 16 pages long. The reduction led to a fine print that some respondents may have regarded as too fine to read with ease.

Bourgue and Fielder (1995: 17) warn that self-administered questionnaires should be shorter

than questionnaires administered in other ways, while Oppenheim (1992: 105) states that long and complex questionnaires will only be completed successfully if the topic is of intrinsic interest to the respondents. The researcher's introductory note at the outset of the questionnaire stressed the importance of his/her response. It was assumed that respondents would be motivated enough to respond to a survey which dealt with the training of horticulturists, i.e. something that is central to the future of the industry. If the questionnaire had been shortened, the response rate would probably have been higher.

3.4.3.4.2 Format

Virtually all the questions included in the questionnaire were closed-ended. Most questions did ask for a reflective response, i.e. they required an amount of deliberation before completing. Respondents were warned in the introductory letter that they would require 30 minutes to complete the questionnaire and this time would have been taken up in considering their answers. As virtually all questionnaires were fully completed, one may assume that respondent fatigue was not a serious problem. The only question that was not always fully answered (Question 9) related to the writing of specific skills/competencies. This question required the respondent to identify five to seven skills/competencies for up to 10 fields of learning. Some respondents informed the researcher in later conversation that they had completed the questionnaire in batches, i.e. had kept it on their desks and had filled it in when they had a few spare minutes each day. Very few respondents seemed to have difficulty in understanding the questions.

The questionnaire comprised Section A with seven questions on general and biographical questions and Section B with seven questions relating to the identification of skills/competencies. The latter included two questions that asked for suggestions and or other comments.

Bourque and Fielder (1995: 17) state that a self-administered questionnaire must "stand alone", i.e. that all the information that the respondent needs to complete the questionnaire must be provided on the questionnaire. Every effort was made in this study to ensure that this was the case; in fact some respondents stated that this was overly well explained.

TABLE 3.4: MAIL QUESTIONNAIRE

SECTION A

1. Please identify: a) the **sectors** of the industry that your company/institution operates in; b) how many **horticulturists** (i.e. both those qualified and also those practising as horticulturists based upon experience) work in each of these sectors: AMENITY HORTICULTURE, ARBORICULTURE, FLORICULTURE, LANDSCAPE, NURSERY - PRODUCTION, NURSERY - RETAIL, TURF AND OTHER.
2. Please identify which sector you are primarily employed in at the present time (choose only one): AMENITY HORTICULTURE, ARBORICULTURE, FLORICULTURE, LANDSCAPE, NURSERY - PRODUCTION, NURSERY - RETAIL, TURF AND OTHER (SPECIFY).
3. Does your company/institution provide **in-service training programmes** (e.g. computer course) to horticulturists (i.e. not day-to-day training by supervisors or the training of students)?
4. Please list the **qualifications** (also short courses) which you have obtained under each of the sectors listed: AMENITY HORTICULTURE, ARBORICULTURE, FLORICULTURE, LANDSCAPE, NURSERY - PRODUCTION, NURSERY - RETAIL, TURF AND OTHER (SPECIFY).
5. Please list the **number of years of experience** you have in each of the sectors i.e. irrespective of whether you have been working in more than one sector at a time.
6. Please indicate the **broad division of responsibilities** in your current position in terms of: a) horticultural related; b) managerial/administrative and c) other responsibilities?
7. Please suggest an **appropriate name** for a horticulturist working in your sector (e.g. horticulturist in Arboriculture = Arborist): a) name of your sector; b) suggested name for hortculturist.

SECTION B

8. In phase 1 of this research project, focus groups for each sector identified the following **fields of learning (i.e. a group of competencies of skills)** which represent the work of a graduate, i.e. a recently qualified horticulturist working in that sector. Your assistance is required in this question to allocate the time a student studying for a career in your sector should spend on each of the fields of learning:

a) Would you please select the sectors below to which you have been exposed, i.e. in which you have either a qualification or experience and allocate a weighting in percentages to each of the fields of learning? You may add other fields of learning if you wish using the other category?

b) Indicate, in your opinion, how well graduates, immediately after completing their formal education, have readied or prepared themselves for each field of learning?

9. This question is a follow-up to Question 8. Please identify for each field of learning (eg. communication) within your specific sector, five to seven **specific competencies/skills** (e.g. writing reports or public speaking) you regard as important: a) Name your specific sector (e.g. Arboriculture); b) Please write in the names of the fields of learning of your sector (e.g. 1. Arboriculture and the law, 2. Arboricultural skills); c) List five to seven specific competencies/skills you regard as important within each field of learning in your sector.
10. Phase 1 of this project also identified the following broad **attributes (i.e. characteristic qualities)** employers' desire in a horticulturist entering into their employment. Please indicate in the columns provided and on a scale of 1 - 5; a) How important you regard each of the listed attributes to be; b) how well you think horticulturists in general are achieving the attributes.
11. Should you prepare the **course of study** for a student who is studying for a career in your sector, how would you sub-divide his/her time (or exposure) to both your sector as well as to the other sectors? (Please indicate

this below, again as percentages, remembering that you could indicate 100% to your sector if you believe a student needs to be fully specialised in that sector.)

12. Presume a horticulturist in your sector has been qualified for more them two years. How would you sub-divide his/her **responsibilities?** (Please indicate as percentages.)
13. Please use the space below to make any other **suggestions** pertaining to the training of horticulturists.
14. Other comments?

The questionnaire asked respondents in a number of questions to allocate a percentage rating to e.g. fields of learning within each sector, division of their responsibilities and also a division of the responsibilities of a qualified horticulturist. A Likert-type scale was used in two of the primary questions and these related to importance (score 1 for no importance and 5 for extreme importance) and to achievement (score 1 for no achievement to 5 for excellent achievement).

3.4.3.4.3 Structure

The questionnaire was printed in landscape format with text on the left and right side of each page. Printing was also done on both sides of every page. These measures served to save space and meant that the whole questionnaire was printed on eight pages (both English and Afrikaans).

The first two pages were reserved for the introductory letter, for an explanation on how to complete the questionnaire and also for a section for the respondent's contact details.

The questionnaire was printed on blue paper (recommendation by Crompton 1985: 88) with the Cape Technikon logo and a clear heading so that its subject was easy to recognise. Questionnaires were folded and placed together with a franked envelope into an A5 envelope. Questionnaires were not printed to form an A5 booklet, but were stapled in the top left corner only. This enabled respondents to tear off the English or Afrikaans sections and return the completed section only, also to fax the completed questionnaire to the researcher. Respondents were requested to complete the questionnaire and have it returned to the researcher by a set date. Respondents were normally given two weeks for this. Each new batch of questionnaires was given a new submit-by date. The submission of the questionnaires in the two or three batches occurred from early June to late July. The criticism lodged against this timing was that it was either too close to the school holidays or that the

nursery trade was entering its spring season or that everyone was too busy.

The progression in the questionnaire from basic demographic questions to general and biographic to the body which related to identifying skills/competencies was a development from simple to complex, but was also a logical order or sequence.

Oppenheim (1992: 105) states that there have been many experiments with general layout, type face, colour and quality of paper used in mail questionnaires, that no clear conclusions have emerged and that it is best to aim at a relatively "conservative" but pleasant appearance. These and other questions were put to the respondents during the pre-test of the questionnaire. Minor adaptations were made as a result of this, but on the whole, most respondents felt that the structure and format were acceptable.

3.4.3.4.4 Confidentiality

Although there were no questions in the questionnaire which could be construed to be of a sensitive nature, respondents were informed that their responses would be held in the strictest confidence. They were also informed that if there were any questions that they would rather not answer, they should simply go on to the next question.

3.4.3.4.5 Incentives

Respondents were not offered any incentives for submitting their completed questionnaires as the researcher believed that the opportunity they were being offered to make a positive contribution would be adequate to enlist their support. Oppenheim (1992: 105) states that long and complex questionnaires will often be completed successfully if the topic is of intrinsic value to the respondents. However, the offering of some form of reward may have raised the response rate.

3.4.3.4.6 Pre-testing questionnaire

The final pre-testing of the questionnaire comprised asking 15 educators at both the Cape Technikon and Natal Technikon as well as 19 practitioners to peruse the questionnaire and to complete it as fully as possible, also making comments on the side of each question as they worked their way through it. This served to pinpoint a number of ambiguities, repetitions of

instructions and questions that were too complex to include in a mail questionnaire. A general comment was that the questionnaire was too long and should be simplified. Changes were made to the questionnaire, including reducing the number of questions to the final 14 that were used. The questionnaire was then translated into Afrikaans and both were proofread and edited for grammatical and spelling errors.

3.4.3.5 Importance-Performance Analysis

The evaluation technique of Importance-Performance Analysis, whereby the attributes of a particular phenomenon are identified and respondents in an interview or questionnaire survey are asked to evaluate these in terms of their importance as well as the agency or institution's performance in achieving these has been used in many industries. These have varied according to Oh (2001: 617) from the service industries (Martilla & James 1977) to travel and tourism (Evans & Chon 1989), leisure and recreation (Guadagnolo 1985) and to education (Alberty & Milhalik 1989). In his needs analysis of the participants in a leadership training course, Kapp (2000: 288) asked respondents to rate on a 7-point Likert scale, firstly the importance of certain identified attributes of leadership and secondly their perceived competence in that particular area. In this study, the attributes which an employer would expect to find in a graduating horticulturist were identified in the focus group interviews and in the mail questionnaire survey, respondents were asked to rate these in terms of importance and achievement (i.e. performance) on a 5-point Likert-type scale.

3.5 SUMMARY

This chapter sought in the first instance to motivate why this research is both exploratory and descriptive and also why it uses a dual-approach that is quantitative as well as qualitative. This pragmatic approach to the study has not intended to be eclectic, but has aimed at obtaining the best of both the quantitative and the qualitative worlds. The characteristics, the advantages and disadvantages and the criteria of reliability, validity and objectivity were listed for both approaches. The use of a triangulation approach was discussed as a methodology that enables a researcher to transcend the quantitative-qualitative divide.

The remainder of the chapter sought to identify the three research methods used in this study, to motivate their application to the research problem and to explain their use. The position of each relative to the quantitative-qualitative dichotomy was explained. The use of a

triangulation approach to this study whereby different yet complementary research techniques were used, was motivated. The personal interviews were used to clarify the research problem and to identify critical key areas to be included in the ensuing stages of the research. The two qualitative methods, i.e. the focus group interviews and the personal interviews, were applied to the Western Cape and enabled the researcher to delve into the deeper issues under study. The mail survey which utilised self-administered questionnaires attempted firstly to generalise the findings of the qualitative methods to a national level and secondly to collect empirical data which would be used to corroborate or to disprove the grounding for the qualitative findings. The measures taken to ensure the validity and the reliability of the techniques used and the objectivity of the researcher were substantiated in the discussion of the three techniques. In attempting to explain these, the researcher has endeavoured to be as honest and objective as possible.

CHAPTER FOUR

ANALYSIS OF DATA OBTAINED FROM THE PERSONAL INTERVIEWS

4.1 INTRODUCTION

The selection of personal interviews as a pretest research technique to the methodologies that were to follow was based upon an explorative approach. In essence the personal interviews were aimed at the identification by practitioners of the core skills/competencies required of a qualified horticulturist, i.e. whether having qualified with a National Diploma in Horticulture, Landscape Technology or Open Space and Recreation Management. These skills/competencies were to be identified so that the researcher would be enabled to obtain a deeper understanding (qualitative approach) of the duties performed by a horticulturist within the context of the broader industry.

A total of 18 questions were put to the interviewees (see Table 3.1 for a full tabulation). The first eight questions related to biographic questions and also to the interviewee's employment position and range of experience. The following 10 ranged from those relating to the skills the interviewee expected to see in a qualified diplomate (in either of the respective diplomas), which of those were not being adequately provided for in current training, how SAQA's critical outcomes could be best learnt by learners, to questions on the challenges facing the horticulture industry today and problems in the training and education of all levels of staff in South Africa.

As the personal interviews were used as a pretest, the researcher was able to test the responses to questions in terms of whether they should be used in either the focus group interviews or the mail survey to follow. Many of the questions were re-used; some were adapted while others were expanded. A number were discarded, primarily because of the need to cut down on less important questions and because a response had been received and no further clarification was considered essential.

As explained in Paragraph 3.4.1.4, an interview schedule was used to aid the researcher in conducting the interviews. All interviewees were also asked to complete the schedule where the interview had to be curtailed because of a lack of time.

The results of the personal interviews are discussed in the following paragraphs. The full interview schedule is attached as Appendix 3.1.

4.2 DISCUSSION OF RESULTS OF PERSONAL INTERVIEWS

In each of the following sub-paragraphs, each question or group of complementary questions posed to interviewees will be briefly discussed, followed by a discussion of the outcome of the personal interviews.

4.2.1 Personal, professional and employment details

Firstly, interviewees were asked to list the normal biographic and contact detail. This was followed by four questions relative to their qualifications, where they are employed, what position they hold, what the nature of their company's business is, how long they have worked in that particular sector of horticulture and what other sectors they have worked in. Interviewees were selected by the researcher (in certain cases on the advice of an expert in that sector) so that they were representative of the various sectors, available qualifications, experience, seniority and state and private employment. The 25 interviewees were selected on the basis that they represented the seven identified sectors of the horticultural industry, that they held varying positions of seniority and that they had a range of qualifications and experience in horticulture.

Most interviewees had a National Diploma (ND) in Horticulture while others had either a ND in Landscape Technology, ND in Parks and Recreation Management or a B.Sc. in Agriculture. Most interviewees had in excess of 10 years' experience in one or more of the sectors of horticulture. This experience had been gained in either the state sector or the private sector. Although all interviewees were currently working in either the Southern or Western Cape, many had worked elsewhere in the country.

Interviewees were asked to indicate whether their company/institution provided structured in-service training on management, supervisory or craft and labour levels. They were also asked to specify the type of training on each level and to indicate who provided the training. Most of their companies/institutions provided some form of training, although this varied greatly and was not always offered at all levels. Many companies/institutions offered this in-house, particularly to lower levels or had a training agency perform this function,

particularly on senior levels. The municipal parks and recreation departments provided the broadest range of training opportunities e.g. managers were trained in project management, labour legislation and financial planning. It is clear from the above response that very little training is being provided, particularly in the private sector. This response indicated that further clarity on the type and extent of training is required, hence the inclusion of a similar question to this in the mail survey (see Paragraph 6.3.3).

Interviewees were asked whether they regarded themselves to be well, reasonably or poorly informed regarding the National Qualifications Framework. Most interviewees stated that they were reasonably informed, while only two stated that they were well informed.

In any attempt to gauge the opinion of interviewees on the structure of professional horticulture in South Africa, interviewees were asked to evaluate this aspect in terms of how representative the industry is on professional and other bodies. Most interviewees stated that they knew too little to comment. Five interviewees stated that there was no single coordinating body and that horticulturists should be represented both locally and overseas on suitable professional bodies. This is particularly necessary when legislation and the formulation of policy is being discussed. As one interviewee said: "(W)e are without professional and legal 'weight' and are therefore fairly toothless."

The response to the questions of a personal, professional and employment nature provided the researcher with essential background to gaining a profile of the interviewees who were invited to participate in the personal interviews. The profile obtained in the personal interviews was maintained as far as possible throughout the study. This aspect is an important criterion in fostering the reliability of the study.

The identification by the interviewees of skills/competencies is discussed in the following paragraph.

4.2.2 Identification of skills/competencies

Interviewees were asked to list all the skills/competencies that they would expect of a horticulturist with a three-year national diploma. A following question related to the respondent's opinion as to which of those listed by them were inadequately provided for in

technikon training in South Africa. Interviewees were also asked to motivate their response to the latter question. Responses to these three questions were to be noted on an attached blank form. These questions are dealt with jointly in the following paragraph as interviewees regarded the sub-questions as complementary to one another. It was also not possible to place the responses to both questions into a validated rank order, except that in tallying the responses, the researcher was able to place the skills/competencies into a list that represents the frequency of responses. The discussion of skills/competencies in the following paragraph represents this listed order.

The skills/competencies listed by interviewees have been categorised into those of a horticultural nature and those of a managerial nature. An appropriate comment made relative to management related skills was that "there is a perception that the course concentrates more on the technical aspects of horticulture".

4.2.2.1 Horticultural skills/competencies

The skills/competencies of a horticultural nature are listed below:

Plant propagation
Plant knowledge
Using growth media
Irrigation systems
Utilisation of plants
Maintenance of plants
Plant protection
Environmental management
Horticultural tools, equipment and machinery
Plant sales

The interviewee response under each of the above categories of horticultural skills/competencies is described below:

(a) Plant propagation

Most of the respondents stated that horticulturists should have developed the ability to propagate a variety of plants and should also be able to use a wide variety of different methods. Nursery practice and the ability to manage a glasshouse to different environmental conditions are considered as vital. Students should have the ability to cultivate plants for quality improvements and apart from ornamentals, should be able to cultivate fruit trees, vegetables, turf grasses and cut-flowers. A good knowledge of botany was mentioned as important to understanding plant propagation. Respondents stated that they felt that students needed more workplace experience in propagation techniques.

(b) Plant knowledge

Knowledge of the characteristics of a wide variety of plants and their families is considered as critically important for all horticulturists. This should include the ability to identify plants from a variety of plant material and to fully understand each plant's optimum growing conditions. An understanding of plant morphology and bio-mechanics was seen as important to this plant knowledge. Of particular importance is the comment that this knowledge should be applied to horticultural production and to landscape utilisation. The concern was raised that plant knowledge is currently superficial and that "plantsmen" who have an intimate knowledge of and are passionate about plants and their culture are a dying breed.

(c) Using growth media

The ability to use soil and other growth media for plant growth and ecological sustainability was seen as an important skill by the majority of respondents. Apart from a good knowledge of soils, their origins and their characteristics, students should also understand the use of organic and inorganic soil amendments, additives and fertilizers. An understanding of climatological influences on plant growth and on soil was mentioned by a number of respondents. Students should also know more about permaculture and organic growing principles and their application to practical horticulture. The latter were not receiving adequate attention in present curricula.

(d) Irrigation systems

More than half of the respondents stated that students urgently need to be given practical knowledge and experience in the design and installation of irrigation systems in all horticultural applications. The basics of irrigation science should be taught. Students should particularly be familiar with the component parts, their assembly and their installation and maintenance. This skill was particularly regarded as important by graduates of between two and seven years, who unlike the more senior graduates, are involved with irrigation systems on a daily basis and are more aware of the shortcomings in their training as well as the fast changing nature of irrigation technology. It was mentioned that irrigation should be taught as a separate subject and not as at present as a minor part of a number of subjects.

(e) Utilisation of plants

The ability to apply or use plants in different situations was seen as important and also as an aspect which is presently not receiving enough attention, particularly with the ND in Horticulture, where design and landscape skills are a small part of a first-year subject. Plants are regarded as central to the task of horticulture and the ability to fully utilise these is critical to gaining the greatest aesthetic and functional value. Respondents mentioned also that a good grounding in earthworks, drainage and irrigation should be part of any landscape studies, that hard landscaping should be included, as should interior plantscaping. A thorough proficiency in the drawing and interpretation of plans, the preparation of bills of quantities and scheduling of site works were also listed as aspects that should receive more attention. Expertise in preparing plants for sale, especially in garden centres, was seen as important. Another deficiency in current courses mentioned was that students know too little of the harvesting, storage and marketing of cut-flowers.

(f) Maintenance of plants

The ability to effectively maintain plant communities was identified as a primary function of all horticulturists. It is seen as a function with great variation not only according to environmental factors (e.g. soil, climate), but also according to the function (e.g. cut-flowers compared to decorative plantings in botanical gardens). Divisions across the

profession are found according to plant use and their subsequent maintenance, e.g. arboriculture, turf grass maintenance, fruit and vegetable production and indoor plant maintenance. The "service" or cultural functions applied to these would include pest, weed and disease control, pruning, fertilisation, irrigation and many others. These too vary according to the particular plant community and its function. Aspects mentioned by respondents as being deficient were landscape maintenance, the management of nature sensitive areas and particularly tree surgery. A senior municipal manager pointed out that the maintenance of sports turf areas is vital and should receive greater practical attention in the course.

(g) Plant protection

The ability to identify the respective weeds, pests and diseases which threaten the survival or hamper the normal growth of selected plants, whether these be young seedlings or mature street trees, was a skill identified by the majority of respondents. The point was made that horticulturists should be able to manage the protection of these plants using the latest, safest techniques (preferably non-chemical) with particular consideration to the preservation of the environment. This point was strongly emphasized by respondents in their listing of inadequately provided skills. It was also stressed that more practical excursions during the theoretical training would help to reinforce the practice of ecologically sensitive techniques.

(h) Environmental management

The aspects of environmental legislation, environmental management systems, Environmental Impact Assessments (EIAs), Geographical Information Systems (GISs) and a general environmental consciousness should be emphasised in all facets of training "as the enhancement of the overall environment is our industry's overall objective".

(i) Horticultural tools, equipment and machinery

Several related matters were listed relative to this important aspect which was emphasized by more than two-thirds of the respondents. Central to skills in this area is that horticulturists should be fully aware of what tools, equipment and machinery are available in the industry and what their applications are. They should also have a good practical

knowledge of their operation and maintenance and of the mechanics involved. Horticulturists should be able to troubleshoot in the field operations in which they are involved. Safety aspects, knowledge of relevant legislation and a heavy-duty driver's licence were also mentioned. Recently qualified horticulturists were emphatic that training at technikons should be much more practically related and should prepare them for "hands-on exposure". The point was made that using machinery is a major part of a horticulturist's job and "we learn this the hard way".

(j) Plant sales

The ability to sell the plants propagated and grown-on was also mentioned as an important skill, particularly when working in a profit-centred business.

4.2.2.1.1 Summary of horticultural skills/competencies

The list of skills/competencies in the above paragraph reflects the range of skills/competencies that are required of a horticulturist. These could be summarised in a logical sequence of skills/competencies as those of having a good knowledge of plants and their characteristics, propagating and growing plants, using growth media, irrigating plants, protecting plants, maintaining plants, selling plants and using plants in a variety of ways. Added to these are environmental management and the tools and equipment required to attend to all of the skills/competencies. While plant propagation and plant knowledge have been shown to be the most important, all of these listed horticultural skills/competencies are interrelated and integral to the functioning of a horticulturist.

4.2.2.2 Management related skills/competencies

The respondents mentioned a total of eight management-related skills/competencies. These are listed below:

Communication
Computer literacy
Financial management
Organisational
Supervisory

Labour relations
Human resources management
Planning/scheduling

The interviewee response under each of the above categories of managerial skills/competencies is described below.

(a) Communication

The ability to communicate is seen as an important skill, particularly on "how to handle difficult customers". Together with communication, public relations should also be given greater emphasis at technikons, referenced to all aspects of marketing within the green industry. The point was made that communication is so important that one "can't wait until it develops in time".

(b) Computer literacy

Basic computer literacy still does not receive enough attention at technikons and a complaint raised was that this should be a full subject and not left to the individual where it is usually developed as an interest. Students should be able to do basic computer tasks when they arrive on their first jobs; "we need to be end-user computer literate".

(c) Financial management

The ability to undertake financial management and particularly to maintain budgetary control was given the highest rating by respondents both as an important management skill and as an area of the curriculum which needed most attention in future courses. Listed also were the following: the ability to analyse financial statements, basic bookkeeping, quoting, tender procedures, costing, cash flow, budget control and local government financial procedures. Several respondents listed entrepreneurial skills as important and deserving of greater emphasis in current training. As one respondent stated: "One is just expected to have a business mind."

(d) Organisational

Organisational skills were also given a high rating, both by recent diplomates (responsible for running horticultural teams) and senior officials in the public sector and nurserymen, where responsibilities are much broader and organisational skills are critical to the performance and productivity of units and departments. Leadership, drive, integrity, responsibility, creativity and the ability to undertake the management of a project were also listed as important. The point was made that students must obtain organisational workplace experience during their periods of experiential training.

(e) Supervisory

As young horticulturists are soon placed in charge of small teams, it was felt that supervisory skills should not be left "for us to pick up". It was identified as an inadequacy in their training. It was suggested that students should work in teams while doing their theory, and that their practical training should assist in developing supervisory skills. Clear tasks of a practical hands-on nature should be given and full responsibility should be given to individuals, groups or teams in meeting the set goals.

(f) Labour relations

The aspects of conflict resolution, negotiation and labour law were mentioned by respondents as specifically important in dealing with people. While on-hands experience develops in practice, the reality of dealing with labour, disciplinary procedures and other labour related problems "throws one in at the deep end". These aspects are inadequately covered in technikon training.

(g) Human resources management

Respondents felt that all aspects of human resources management should receive more attention, particularly performance appraisals and incentive schemes. The following serve as examples of aspects of performance management that should be highlighted: performance measurement, factors enhancing performance and the evaluation of the quality of service delivery.

(h) Planning/scheduling

The ability to undertake general planning and/or to schedule tasks is regarded as essential in the career of a young horticulturist. Two comments received were; "We have to plan and schedule on a monthly, weekly and daily basis," and "We have to be able to plan any operation and carry it out on our own". This skill can also be defined as Project Management as it is critical to all horticultural activities, therefore the interrelationship of policies, projects, facilities and products should be clearly understood.

As important as the horticultural skills/competencies were reported to be, the management related skills were seen to be as significant, yet in many respects more critical to the successful performance of a horticulturist. These listed skills/competencies are also applicable to the job performed by a general horticulturist as interviewees were not asked to specify to which sector they were referring. They are all of a general nature and on studying the interviewee comments, it is clear that they are equally significant, in fact essential to the operation of a horticulturist. Most of these listed above have drawn a comment which refers to the fact that graduates are "expected to know" these things, whether these be talking to clients, understanding a financial statement or planning a project of some sort.

4.2.2.3 Summary of identified skills/competencies

The personal interviews were undertaken as a pretest prior to the more comprehensive focus groups and mail survey which were to follow and were primarily aimed at identifying the skills/competencies required of a horticulturist. These were not specified as being those required of a horticulturist working in a specific sector, but rather those required of a general horticulturist. It is important to note, therefore, that a general horticulturist is seen as an individual with a variety of plant growth, plant use, plant maintenance skills/competencies as well as a range of general management skills/competencies. From the comments made by interviewees it would appear that students are adequately trained in the horticultural aspects of their jobs, yet their managerial training is inadequate and is largely taken for granted as something one imbibes by exposure to the workplace.

Interviewees were asked to specify what problems they saw in the education and training of all levels of staff in the horticulture industry. The response to this question is discussed in the following paragraph.

4.2.3 Identification of problems in education and training

Some of the problems interviewees saw as important in the education and training of all levels of staff in the horticulture industry were the following: the need to provide short-courses on managerial training, providing public sector training with restricted funding, lack of entrepreneurial skills, a greater emphasis needed on environmental sustainability and lower levels of staff in urgent need of training.

The inclusion of this question in the personal interview pre-test served the purpose of identifying a number of industry problems, but more importantly, the extent of the problems in the broader industry were pinpointed. These will be studied in greater depth in the sections on the focus group interviews and the mail questionnaire.

In a similar question to the above, but one in which the emphasis was placed upon the industry in general, interviewees were asked to specify the challenges they saw facing the horticultural industry in the next five to 10 years

4.2.4 Identification of challenges facing the horticulture industry

The challenges listed by interviewees varied from those relating to the need to adapt to downturns in the economy, water restrictions (e.g. adapt marketing to conservation issues as is current with water-wise gardening), environmental pollution and general awareness, innovations in technology, resistance in virile pests and diseases, privatisation of municipal horticultural services, changes in labour legislation and fluctuating standards of quality.

To attain an in-depth understanding of both the problems and the challenges facing not only the broader industry, but also the different sectors of the industry, the researcher considered it important that a broader audience be asked to further highlight the specific problems and challenges in the different sectors. The extent of the problems and the corresponding challenges in the horticulture industry will be studied at greater depth in the following stages of the investigation.

The response of interviewees to the question of where SAQA's "critical outcomes" could best be learnt is dealt with in the following paragraph.

4.2.5 Incorporation of critical outcomes into curriculum

Interviewees were provided with a list of SAQA's "critical outcomes" (see list in Appendix 3.1), which are to be incorporated into all qualifications, and they were asked to suggest how they thought learners could best learn these. The relevance of this question lies in the fact that all training providers will be obliged to give attention to this question. In technikon education, much of the learning of critical outcomes will take place during experiential training. The researcher purposely included this question because members of the industry, (e.g. the 25 interviewees selected for the interviews) will have to consider how they would best be able to provide opportunities for their experiential learning students to identify and solve problems, work effectively with others, and so forth.

Thirteen of the interviewees were not sure how they as trainers would provide for this. Twelve interviewees responded to this question and stated mostly that opportunities to learn these "life skills" would have to be shared by the technikons and the experiential training providers.

Individual suggestions included the following:

(a) Identify and solve problems

- Through case studies and group discussions
- By example of achievement of others
- By putting students in practical simulated cases and evaluating their performance

(b) Work effectively with others

- By giving groups a project to carry out
- By establishing an individual's team role
- By giving each the opportunity to instruct, co-ordinate and lead the groups

(c) Organise and manage oneself

- By introducing time management principles and controls
- By showing the best way to do this and then testing through examples
- Through a performance management course

(d) Collect, analyse, organise and critically evaluate information

- By training learners to read properly
- Through a course on project management
- By looking at examples of successful companies

(e) Communicate effectively

- By using real examples from companies
- By practical experience
- By doing presentations in class
- By concentrating on assertive behavioural skills, whereafter communication skills will follow

(f) Use science and technology

- By not training them on what to do, but why they are doing it
- By attending seminars, congresses and workshops
- By emphasizing the importance of this and by teaching by showing and studying real life examples

(g) Demonstrate an understanding of the world

- By sending members who are employed to meetings, etc. where they represent their organisations
- By setting a problem, breaking it up into its simplified units, seeking the solution to each and then getting to the total solution

One interviewee stated that the learning of all of these critical outcomes "... requires hands-on first-line involvement where the real world cannot afford people making mistakes (to learn)".

The identification of the most suitable location where students would be able to learn the critical outcomes identified by SAQA is an important issue in technikon education as it could be taught on campus at technikon or it could be taught in the workplace during the student's period of experiential learning. Interviewees agreed that this was in fact a joint responsibility and that the aim should always be to replicate real-life situations, particularly in an outcome like "identify and solve problems".

4.3 SUMMARY

The use of personal interviews as a pre-test or trial survey enabled the researcher to gain a greater understanding of the training needs in the horticulture industry. It also served as an aid in the identification of issues for inclusion in both the focus group interviews and the mail survey. A depth of understanding of the research problem was gained that could only be obtained from a qualitative research technique like personal interviews.

Interviewees were asked a broad range of questions that included a number relating to their qualifications, experience and professional/employment position. The response to these specific questions enabled the researcher to draw a likely profile of the interviewees who were to be invited to participate in the focus group interviews and to whom the mail survey would be addressed. The 25 interviewees represented a cross-section of the seven sectors and were well qualified and experienced. The researcher endeavoured from the outset of this study to ensure that interviewees and respondents were representative of the various sectors, available qualifications, experience, seniority and state and private employment. The identification that participants and respondents had with specific sectors was an important aspect in selecting individuals who would be best suited to assist in the research process. In the research methods that followed the personal interviews, sectoral expertise was regarded as of critical importance in generating data that is appropriate to the specific sector.

Staff in-service training was not being done by the majority of employers and was clearly a major shortcoming on all levels. The professional organisation of the industry was seen as

deficient, particularly as no general co-ordinating body is in existence and horticulturists do not have a national professional body.

The most important data from the personal interviews related to the identification of the skills/competencies that one could expect to find in a horticulturist with a three-year national diploma. The identification of the skills/competencies one may expect of a graduating horticulturist revealed that two major categories of skills/competencies exist, viz. horticultural and managerial. The former varied from plant propagation, plant knowledge, using growth media and irrigation systems to environmental management and plant protection. The management related skills/competencies varied from communication, computer literacy, financial management and human resources management to organisational, planning/scheduling and labour relations. The identification of those that are inadequately provided for in technikon training served to highlight areas of possible concern. These were pointedly more those skills/competencies of a managerial nature.

A range of problems and challenges were identified which varied from water restrictions, environmental pollution and plant resistance to diseases and pests. This data suggest that a great need exists to improve the level of training in the country. Interviewees were also asked to comment on what they considered to be the best learning situations for SAQA's critical outcomes.

The undertaking of personal interviews as a qualitative research technique to explore a topic or problem is a useful one and enabled the researcher to directly address the research problem. Central to this study is the undertaking of a situational analysis that is aimed at understanding the job profile of a horticulturist. This must of needs lead to curriculum revision where a full understanding of the skills/competencies of a horticulturist is gained. The identification of the skills/competencies required in technikon qualifications in horticulture was identified as one of the secondary aims of the study.

The following chapter will report on the data gathered during the 14 focus group interviews. As with the personal interviews, it also reflects a qualitative technique and is chiefly aimed at further understanding the problem under study.

CHAPTER FIVE

ANALYSIS OF DATA OBTAINED FROM FOCUS GROUP INTERVIEWS

5.1 INTRODUCTION

The focus group interviews reported upon in this chapter enabled the researcher to investigate several broader, yet cardinal aspects relative to both the seven identified sectors and the industry in general. These varied from the values seen to be inherent to the discipline of horticulture, the attributes or qualities employers may desire of a horticulturist, the current and envisaged future problems or challenges typical of each sector to what changes were taking place within sectors as well as across the industry. Participants were also questioned about the core and specific skills/competencies that they saw as central to their particular sector. The determination of a comprehensive range of skills/competencies across the seven sectors was the primary aim of the focus group interviews. The interview schedule concluded by asking participants to identify those aspects of the job that horticulturists struggle with when they first start working, the background knowledge (e.g. botany, science, mathematics) they thought was important and what criteria the technikon should bear in mind in selecting students for a particular sector. Participants were asked to indicate their years of experience in each sector. Space for other comments was also provided for.

The data generated by the focus group interviews will be reported both in a descriptive manner as well by the use of frequency tabulations (Tables 5.1 to 5.21). While the latter may be the norm in reporting quantitative data, it serves a useful function in this chapter in that qualitative data has been concisely represented according to the extent (or frequency) of the responses received. Use will also be made in the frequency tabulations of rank order placement as a means of indicating relative importance. It should be noted that this procedure has purposefully been followed as a bridge to linking the focus group interviews and the mail questionnaire survey.

The use of an interview schedule or questionnaire, which was submitted to the participants prior to the focus group interviews, has been discussed in Chapter 3. As a great deal of information was being collected, the questionnaire provided the researcher with a vehicle to collect much of this prior to the interviews (in that participants arrived with completed

questionnaires) and at the same time participants were fully aware of the topics to be discussed.

In the paragraphs below, each of the questions in the schedule will be discussed in the same sequence in which they occur in the schedule. (This sequence can be seen either in the schedule attached as Appendix 3.5 or in Table 3.2, a summary of the questions only.)

5.2 VALUES

The decision to incorporate a discussion debate on the cardinal values one may expect to find in a horticulturist was based on two premises. The first of these was that a debate of this nature would be a good icebreaker at the focus group interviews (as it well turned out to be). Secondly and more importantly, the question was posed by the researcher that in the training of horticulturists, general agreement on cardinal values and the inculcation of these in trainees was presumed to be important in laying the foundation for a professional ethic. Participants were asked to name what they regarded to be the most important values in the field of horticulture (e.g. to conserve water) and to rank the most important of these in order of importance by noting a 1 to 5 next to the selected values.

In analysing the values listed by the participants in their questionnaires and those mentioned during the focus group interviews, the researcher initially felt that the question might not have been specific enough as a broad variety of responses were received. This question did not relate to specific sectors and it was noteworthy that virtually all values listed were common to all sectors and had application to the broader profession. Where specific values were mentioned, these are discussed below, under Paragraph 5.2.1. In the question, "Name in your opinion the most important values in the field of horticulture", participants were given an example of values as being "to conserve water", the intention being to encourage participants to think of all the values underlying their approach to their professions. In the analysis of the responses, the researcher firstly summarized all responses per focus group meeting. No attempt was made to obtain a frequency of responses, except that responses of a similar nature were listed together. In the next stage of analysis, a summary of the frequency of "mentions" (i.e. all listed responses) by each focus group was tabulated under 17 categories or sub-clusters. From this tabulation of the 283 mentions, an abbreviated tabulation showing the 17 categories listed under four clusters of values was prepared (see Table 5.1). The ranking of the clusters of values can

be noted from this table and within each cluster, the categories of values are also listed in rank order. The number of mentions under each of these is also listed and for the clusters of values, the percentage of mentions within each cluster.

5.2.1 Clustering of values

As indicated in Table 5.1, the clusters of values (listed in rank order) are Greening (34%), Environmental (32%), Professionalism (24%) and Managerial (10%). The discussions below are based upon the focus group discussions.

5.2.1.1 Greening

The primary focus in this clustering of values relates to the greening and beautification of the urban environment. Horticulturists are seen as having a specific responsibility towards protecting and improving the urban microclimates, of improving the quality of living through their affinity with plants, their understanding of the aesthetic and functional use of plants and their ability to create sustainable landscapes. The utilization and protection of indigenous flora was seen as an important value in creating low maintenance and sustainable environments. The Arboricultural focus group stated that horticulturists should be able to maintain a long-term vision in their designs, to be able to recognize the long-term effect of planting trees where their functionality in terms of aesthetics, shade, flow of pedestrian and other traffic is sustained.

The provision of sports and recreational amenities to city dwellers and the provision of an aesthetically pleasing and relaxing environment at home and at work were also seen as central to the greening focus.

5.2.1.2 Environmental

The importance of an environmentally sensitive approach to all aspects of their responsibilities was emphasized by all focus groups, possibly best encapsulated in the comment, "Everything we do must be environmentally friendly." This could range from the use of alternative methods of pest control, organic composts and fertilizers, permaculture, recycling, promotion of bio-diversity and the responsible introduction of new plant material to the public.

TABLE 5.1: CLUSTERS OF VALUES IN PRIORITY RANK ORDER				
Value clusters	**No. of mentions (N: 283)**	**Total mentions/ cluster**	**% mentions/ cluster**	**Rank order of value cluster**
GREENING				
• Urban greening and beautification	31			
• Affinity for plants	19			
• Use of indigenous plants	16			
• Sustainability in landscapes	13			
• Provision of recreational amenities	11			
• Creativity in designs	6	96	34	1
ENVIRONMENTAL				
• Environmentally friendly approach	32			
• Conservation of water/water-wise	21			
• Conservation of resources	18			
• Environmental education	11			
• Eradication of aliens	7	89	32	2
PROFESSIONALISM				
• Promotion of horticulture	26			
• Cliet service ethic	24			
• Personal education	11			
• Personal values	8	69	24	3
MANAGERIAL				
• Expertise	17			
• Economic base	12	29	10	4
TOTAL	**283**	**283**	**100**	**-**

An essential outflow of the above is the generation within all horticulturists of a conservation ethic, i.e. a burning desire to conserve all scarce natural resources, particularly water, soils, landscapes and biotic elements. All landscape development should be constructed and maintained with a water-wise orientation and with sustainability in the long term. Rehabilitation of degenerated landscapes and a focus on the reclamation of all natural areas are values that should always remain central to every landscape

design. The protection of biomes, the maintenance of genetic diversity and the eradication of aliens were also mentioned.

The value of environmental education refers to the urgency one hopes to find in all horticulturists, i.e. a commitment to telling others (clients, staff, friends or the general public) of how they too can develop an environmentally friendly approach and how they too can conserve the natural environment. This urgency should include a commitment to the upliftment of individuals and communities, possibly through participation in greening projects.

5.2.1.3 Professionalism

A core value one could expect to find in the professional ethic of all horticulturists is that of the promotion of horticulture as a profession as well as the promotion of gardening as a hobby. The essence of this value is the passing on to others the passion for growing plants, a recognition of their benefits to humans (e.g. horticultural therapy) and a personal pride in the cultivation of plants as agents of conservation.

The value of a client service ethic relates to meeting the customer's needs, of being passionate about service delivery, of providing a quality service which is functional and where quality standards are maintained. In the public sector this value translates to a community service orientation and in the private sector to client service.

The Nursery retail focus group emphasised the need for interpersonal skills and an affinity towards working with people.

Most focus groups expect horticulturists to be broadly qualified and to be especially knowledgeable about the use of plants in varying situations (different macroclimates). It was expected that they would be committed to lifelong learning and to research.

The personal values of integrity, honesty, responsibility and good ethics were also mentioned. It should be noted that these types of values were not generally seen as being requested in this question. The recognition of their importance can rather be seen in question 2 of the questionnaire (see Paragraph 5.3).

5.2.1.4 Managerial values

An important value or approach to the responsibilities performed by horticulturists in the varying sectors is that of "making things work with limited resources". The optimal utilization of resources (e.g. human, financial, material, transport) is essential to this value and is best expressed as a commonsense, practical, yet innovative approach to problem-solving. A profit orientation and recognition that an economic base underlies all operations is critical if commercial viability is to be sustained.

Values listed under managerial expertise other than the above relate to the importance of safety consciousness, maintaining good labour relations, training of personnel (multi-skilling) and organisational abilities. The importance of constantly maintaining a safety vigil was listed by the Arboriculture focus group, not only in respect of tree trimming and felling, but also in all operations where the safety of both staff members and the public could in any way be compromised.

5.2.2 Concluding comments on clustering of values

The categorising of the 283 value mentions into 17 categories or sub-clusters and the clustering thereafter of these into four value clusters has served the purpose of pin-pointing the most important broad values applicable to the profession of horticulture. The identification of these was listed as one of the secondary aims of the study. Although the values inherent to this profession may have been articulated informally at several forums, they have never however been researched as has been done in this study. The fact that the 14 focus groups found consensus on these and that the industry can now actively promote their inculcation in all its members is a positive contribution made by the industry members who made up the focus groups.

5.3 ATTRIBUTES

A total of 379 mentions were made in answer to the question requesting that participants name the most important attributes or qualities that employers desire in a horticulturist. Participants were again asked to rank the most important of these in order of importance, i.e. from 1 to 5. All of the listed mentions have been clustered into 14 different groups, with attributes/qualities, relative to commitment (including, for example responsibility,

dedication, accuracy and being hardworking) receiving the highest ranking (51 mentions or 14%) and plant management skills the second highest ranking (38 mentions or 10%). The groups of attributes are listed below in Table 5.2.

TABLE 5.2: CLUSTER OF ATTRIBUTES LISTED IN RANK ORDER BY FOCUS GROUPS

Attributes	No. of mentions N: 379	Mentions/ cluster	Rank order/ cluster
Commitment (responsibility, hardworking, dedication, accuracy)	51	14	1
Plant management and technical skills	38	10	2
Initiative (being a self starter, self motivation)	35	9	3
Problem-solving (also practical application)	33	9	3
Management skills (also planning and organising)	33	9	3
Passion for plants and the environment	31	8	6
Interpersonal relations (people skills, staff and clients)	29	8	6
Communication and computer literacy	26	7	8
Creativity (also lateral thinking, innovation)	23	6	9
Personal growth, development and confidence	23	6	9
Business skills (also professionalism)	17	4	11
Willingness to learn and ability	16	4	11
Leadership skills	12	3	13
Integrity (honesty, sincerity, work ethics)	12	3	13
TOTAL	**379**	**100**	**-**

The rank order of these 14 attributes is seen as an important indicator to the industry as to what criteria are important in the employment (and retention) of horticulturists. While the question posed stated "what attributes or qualities", many respondents included various skills, e.g. plant management skills, which are not strictly speaking "attributes or qualities". In this analysis, these items were also included, as respondents seem to have considered the question to mean "all aspects". This has led to a list of "attributes" which is more encompassing and which includes a broader range of aspects than only those attributes or qualities (e.g. honesty) normally associated with this term.

The rank order of the 14 attributes was tested in the mail survey in that respondents were provided with the same list in alphabetical order and were asked to accord a point for each of the attributes using a Likert scale (5-point scale with one being no importance). Respondents were also asked to award points for achievement, i.e. whether they regarded

qualified horticulturists in general as having achieved these attributes (5-point scale with one being no achievement and 5 being very good achievement). This is reported in the following chapter (Paragraph 6.4.3).

The significance of including this aspect in this study lies in the identification of those attributes that are important to the employment of horticulturists. The fact that commitment (including responsibility, being hardworking, dedication and accuracy) was seen as the most important attribute, indicates very clearly that it cannot be seen as a given and that it must become a central feature of education and training.

5.4 PROBLEMS AND CHALLENGES

Participants were asked in this question to state what problems and/or challenges they believed their sector of the horticulture industry was facing at the present time (2001). Participants were asked to list as many as possible and then to rank the most important five from 1 to 5. The objective of this question was to determine not only sector specific problems or challenges, but also to identify those that are of concern to the broader industry. The identification of an industry's problems and/or challenges and the institution of the most appropriate means of dealing with them is in the first instance the responsibility of that industry. It is also an aspect that educators should deal with in terms of curriculum planning.

In the following Paragraphs 5.4.1 to 5.4.7, the problems and/or challenges of each sector as articulated by the focus groups representing that sector, will be discussed. The seriousness of a problem and/or challenge has been gained by grouping similar problems and/or challenges into overarching categories and ranking these for each sector. Paragraph 5.4.8 provides a summary and evaluation of the broader industry problems and/or challenges.

5.4.1 Amenity horticulture

A total of 50 different problems and/or challenges were raised by the three Amenity horticulture focus groups. These have been grouped into eight categories and listed in rank order in Table 5.3.

TABLE 5.3: CATEGORIES OF PROBLEMS AND/OR CHALLENGES LISTED BY AMENITY HORTICULTURE FOCUS GROUPS		
Categories of problems and/or challenges	**% of total mentions (N: 50)**	**Rank order**
Labour related	20	1
Public perceptions	20	1
Political influences	16	3
Horticultural/professional	14	4
Budgetary restraints	12	5
Environmental	10	6
Managerial	4	7
Vandalism	4	7
TOTAL	**100**	**-**

The three most important and interrelated categories of problems and/or challenges (56% of total mentions) are those that are labour related and those that relate to public perceptions and political influences. Participants felt (20% of all mentions) that the increasing unionisation of the labour force was a serious obstacle to efficient service delivery. Participants recognised that there was an urgent need to improve the quality of services but that this was being severely hampered by absenteeism, substance abuse, staff shortages, low productivity and negative staff morale. The need for training was also mentioned as important.

Problems and/or challenges relative to public perceptions (20%) related to a dichotomy between public apathy towards the value of the horticultural and environmental services and an increasing demand for an improved quality of service. The latter related mostly to sportsfield maintenance and to street tree maintenance.

Political influences, particularly the current changing structures of local government, were seen by participants (16% of mentions) as a serious obstacle to the stability and the morale of all levels of staff. The old parks and recreation departments were being re-structured and few horticulturists in the municipal sector were still involved in in-depth horticulture. Many horticultural services, e.g. nurseries and arboriculture, are no longer being executed in-house, but are being outsourced. The major problem with the contracting out of services was seen to be the loss of control of the quality of services being provided by contractors, this despite the horticulturist's role as contract administrator

or clerk of works. The latter has led to a change in function with increased administrative responsibilities. It was also mentioned that using and integrating unskilled and often uninformed communities and contractors in projects so as to meet legal obligations was a problem, even though it should be seen as their responsibility in the local authority's upliftment projects.

The third category (14%) of problems and/or challenges was those relating to horticultural professionalism. These relate too to those mentioned above under changing structures of local government. One participant mentioned that he no longer performed any horticultural duties, as he was now responsible for their transport fleet. Staff members in the municipal sector felt that they were losing status, that they were expected to assume responsibility for an ever-widening range of functions, but that their horticultural skills were only required at a superficial level. They were not able to improve the quality of provision because of regular labour disputes and/or budgetary restraints.

Budgetary restraints were listed as a serious problem (12%) in providing a quality service and with regard to increasing productivity. The point was made that low budgets simply lead to a lowering of standards, which again leads to a further demeaning of the functions performed by horticulturists in this sector.

Environmental problems and/or challenges (10%) listed were those of water restrictions, reclamation and revegetation projects, environmental legislation and regulations and an urgent need to educate the public on environmental issues.

Participants (4%) stated that serious vandalism due to various reasons, particularly in new projects, was a serious discouragement not only to staff involved, but also to the communities themselves. The inability to deal effectively with this social problem aggravated the feeling that "one's best was just not appreciated".

In addition to the above problems and/or challenges of a managerial nature (4%), the importance of communication skills was listed. Particularly significant were those of promotion and marketing.

Those participants who worked for the National Botanical Institute (NBI), while working in the public sector, did not have the degree of problems, as did their counterparts in the

municipal sector. Their horticultural responsibilities had not changed much and they were appreciative of the role they still had to play in botanical gardens. Their major problems related to budgetary restraints, labour issues and environmental problems.

5.4.2 Arboriculture

A total of 25 individualised problems and/or challenges were raised by the single focus group for Arboriculture. These have been grouped into six categories and are listed in rank order in Table 5.4.

TABLE 5.4: CATEGORIES OF PROBLEMS AND/OR CHALLENGES LISTED BY THE ARBORICULTURE FOCUS GROUP

Categories of problems and/or challenges	% of total mentions (N:25)	Rank order
Arboricultural/professional	56	1
Client service	16	2
Managerial	12	3
Labour related	8	4
Education	4	5
Environmental	4	5
TOTAL	**100**	**-**

Clearly the issues of greatest concern to the participants were those relating to arboriculture, both as a discipline and as a profession (56% of all individual mentions). Participants reported that they are currently in the process of establishing a professional body for arboriculturists, hence their concern with inconsistencies in quality standards (e.g. tree production, tree planting, pruning, safety, chainsaw operation), after-sales service, delivery logistics, delivery of materials and the need to improve the organisation of the profession. It was felt that horticulturists should become more future oriented, should be more knowledgeable on optimal species selection, should stress the importance of doing formative pruning and that Landscape Architects and builders should be better informed on tree requirements on building sites. One of the biggest challenges is the long-term investment in sapling and small tree production where harvesting may take in excess of five to 10 years. Another challenge is that of knowing which tree species will be required at that time, e.g. for a large coastal development.

Management of the safety of clients is important in arboriculture, especially during pruning and felling operations. Respondents stated that the public is generally ill-informed on issues of appropriate pruning and felling and on their legal responsibilities as owners of large trees. The general public and particularly deprived communities should also be educated on these issues as well as on aspects relating to the urgency of tree planting as a conservation imperative and on the urgency of basic tree care principles.

Other problems and/or challenges mentioned relate to managerial issues, including labour problems and the availability of funds. Problems with the motivation of staff were mentioned as were the urgency of adequate and sufficient training in safety and other arboricultural techniques. The difficulty of undertaking tree work in inclement weather was also important.

5.4.3 Floriculture

The opportunity afforded respondents to discuss their problems and challenges led to a lengthy discussion of the floriculture market in South Africa. Of the 19 problems and challenges listed, 15 related specifically to the floriculture market. These were:

- The local market for cutflowers has changed in as much as distribution has changed from auction floor (Multiflora in Johannesburg) to direct marketing by growers to retailers.
- Spending power in the cutflower industry in South Africa is small because of the small local market.
- The volatility of the South African market is a direct result of the small market and often leads to an oversupply, low prices, sub-standard quality, problems in ensuring continuity and new small producers.
- The option exercised by many producers to diversify because of the small markets leads directly to managerial and infrastructure inadequacies and further problems in cash flow.
- The export market has opened up with potential for earnings in overseas currencies. The European market is sophisticated and adaptations will have to be made bearing in mind the high technical requirements.
- The export market is leading to a bigger target market being reached which means a greater expectation of product life, and therefore greater attention to post-harvest

care and distribution methodologies is required. This has impacted on cost inputs, which has led to greater investment in infrastructure and greater specialisation.

- A limitation in freight space exists between South Africa and overseas markets, also from Cape Town to Johannesburg airports.
- The vacuum packing of fynbos material and the shipping of this to Europe in vacuum coolers are under investigation.

Other problems and challenges listed related to the low productivity of labour, an urgent need to improve management skills and to minimise losses wherever possible. A challenge to the floriculture industry in the Western Cape is that it has a different climate to the northern provinces, and because the industry is bigger in the northern provinces, they often dictate to the Western Cape regarding market requirements. The lesson to be learnt by this example of the influence of climatic variables is that educational providers need to take cognizance of the environmental factors that affect the operations within each of the sectors of the horticulture industry.

5.4.4 Landscape

A total of 81 different problems and/or challenges were raised by the three landscape focus groups. These have been grouped into six categories and listed in rank order in Table 5.5. This table indicates that the greatest (43%) source of problems and/or challenges in this sector lies in the industry itself, its structuring and its organisation. Much needs to be corrected in its professional approach to its industry and to its client base.

Participants stated that poor standards of workmanship existed, that standards were inconsistent, that they varied from business to business and that landscape maintenance standards were particularly low. Great concern was expressed at the lack of quality in plant material available, at the fact that there were insufficient quantities and that the diversity was limited. It was also difficult to source the plant material that one required. It was stated that this was a niche for an entrepreneurial individual and that development in this area was sorely needed. It was also alleged that in many landscape developments, poor selection of plant material had been made because of poor selection decisions and a lack of understanding of plants and their specific growing requirements.

TABLE 5.5: CATEGORIES OF PROBLEMS AND/OR CHALLENGES LISTED BY LANDSCAPE FOCUS GROUPS		
Categories of problems and/or challenges	**% of total mentions (N: 81)**	**Rank order**
Landscape/professional	43	1
Clients/customers	20	2
Labour	14	3
Managerial	11	4
Education	11	4
Environmental	1	6
TOTAL	**100**	-

Participants felt that there were many inadequacies in the design and creation of effective green spaces. These varied from a poor knowledge of plant material (including its nomenclature), its limits, appropriate uses to the ability to effectively interpret a site and its climatic/vegetation dynamics.

Landscape Architects in particular and the industry in general are seen to have a poor knowledge of irrigation products and the design, construction and maintenance of irrigation systems.

The Landscape industry urgently needs to review its professional status and in particular to improve the poor image it has with both the general public and with urban developers. One participant stated that the industry was simply not taken seriously, that it lacked status and that the average horticulturist was seen as not much more than a gardener.

A total of 20% of the problems and/or challenges were client or customer related. Participants pointed out that one mostly has to deal with harsh environmental conditions and that clients often have unfair and unrealistic expectations of what nature can and cannot do. There is an economic downturn at this time which has led to reduced spending power in some groups and consequently to less business. Plants were seen by many as a luxury, while others expected cheap rates (disregarding quality). Non-payment and difficult and unreasonable customers were further problems. Participants felt that their industry usually faced unstable market trends as a result of economics, but also because of clients following popularity trends (e.g. planting indigenous, and planting water-wise plants).

Labour related problems and challenges (14%) revolved primarily around the recent labour legislation changes, unionisation, lack of motivation, low productivity and labour demands. Much of the available labour was regarded as being unreliable. The management of staff was seen as a major challenge, particularly when language barriers existed. There was an urgent need for managerial staff to learn the local African language and to understand the prevalent culture norms.

The categories of management related and education related problems and challenges both drew 11% of mentions by focus group members. General computer skills, computer design skills and the broader managerial skills in financial and labour management were seen as critical. It was pointed out that few horticulturists are good designers, but that they should receive multi-skilled training on tertiary level. Horticulturists have a poor record in research, and funding for this should be provided so that higher level qualifications are attained.

The greatest managerial problems and challenges reported were limited resources; i.e. limited funding, labour challenges and staff training. (A large education gap was noted between workers and managerial staff.) Contract management with its administrative responsibility in tendering and costing was regarded to be important.

Water restrictions were listed as an environmental challenge.

It is worth noting that respondents regarded the source of their greatest problems and challenges to be those which lie in the structuring and organizing of the industry itself and this is reflected by respondents representing other sectors as well.

5.4.5 Nursery production

A total of 80 different problems and/or challenges were raised by the two Nursery production focus groups. These have been grouped into six categories and listed in rank order in Table 5.6.

TABLE 5.6: CATEGORIES OF PROBLEMS AND/OR CHALLENGES LISTED BY NURSERY PRODUCTION FOCUS GROUPS		
Categories of problems and/or challenges	**% of total mentions (N : 80)**	**Rank order**
Nursery production	30	1
Professional/horticultural	20	2
Environmental	19	3
Labour	18	4
Education	7	5
Managerial	6	6
TOTAL	**100**	-

The area of greatest concern for the Nursery production sector is that of the specific problems it has in its day-to-day functioning (30%). Soil mixes were regarded as being of poor quality, not being consistent and with varying pH values. River-sand was particularly difficult to obtain. New plant material (particularly certain species) was difficult to obtain and with the variations in public demand for particular varieties, it was difficult for growers to provide adequately for the market requirements. There is currently a general move away from annuals to the hardier water-wise groundcovers and shrubs. Many of the varieties that become popular nationally are not easily grown in the harsher climate of the Western Cape.

Respondents felt that an urgent need exists to produce plants of consistently high quality and that research into plant improvement techniques should be encouraged. This should include cost saving production methods (e.g. soil media, irrigation and fertilisation schedules). The latter are still very labour intensive. Training programmes should aim to improve propagation skills, irrigation methods, soil mixes and general productivity enhancement.

Closely aligned to the above is the need to raise the professionalism (20%) within this sector of horticulture. Common problems are that growers prefer to remain secretive about their business, and knowledge regarding common pests and diseases is not shared. Communication and partnerships between growers can be improved in the interests of the industry. A general lack of communication (or marketing) between growers and retailers, allied trade and landscape architects on available plant material is a problem which adversely affects the whole industry. The lack of expert knowledge on diseases, fertilisers

and chemicals is a serious problem, as is knowledge on trade marks and plant breeder's rights.

As with other sectors, focus groups in this sector were concerned about the environmental challenges facing the Nursery production sector (19%). These varied from the harshness of the Western Cape's climate (short growing season; severe summer heat and long winter), water restrictions, the urgent need to promote environmental education, the introduction of pest plants through injudicious imports, the build-up of pest resistance (need for alternative control methods) to the over-use of chemicals.

Labour related problems were ranked fourth (18%) and related primarily to productivity concerns, the high costs of labour and the urgent need to provide suitable training. The need to be fully conversant on current labour legislation and its applications on the workforce, unions and strikers was mentioned. A concern was also raised that downsizing of a company's output was a factor which affected one's semi-skilled workers first.

Of less concern to this sector was the education (7%) and managerially (6%) related problems. Training of all staff, including those on management levels, should receive constant attention. Lifelong learning as a principle was to be encouraged to facilitate multi-skilling. Computer literacy was specifically mentioned as being important for all horticulturists. Research into specialised propagation techniques should receive necessary industry funding and support. Apart from the staff and training related problems listed above, high overhead costs were listed as a severe challenge to new growers. An affinity for business and client related skills were also seen as crucial to success in this sector.

5.4.6 Nursery retail

A total of 48 different problems and/or challenges were raised by the two nursery retail focus groups. These have been grouped into six categories and listed in rank order in Table 5.7.

Problems and challenges of a retail nursery nature dominated discussions under this question. The 49% mentions related primarily to an understanding of the retail customer. The first challenge is that the gardening market is limited in South Africa as most buyers regard gardening purchases as a low priority on their monthly budgets. The example was

quoted of a 40-year-old housewife being a typical visitor (who visits in cycles related to school terms) and that nurseries need to understand the mindset of the customers and to retail accordingly. The importance of recognising that nurseries are in competition with other leisure-time pastimes was an important challenge, also that garden centres (as retail outlets) were changing in character to lifestyle centres. Stock on sale has therefore to be as varied as the demand. The public's lifestyle is also changing as people become more homebound and "cocoon" because of security concerns and economic restraints. The public is also generally not prepared to pay for landscape plans.

TABLE 5.7: CATEGORIES OF PROBLEMS AND/OR CHALLENGES LISTED BY NURSERY RETAIL FOCUS GROUPS

Categories of problems and/or challenges	% of total mentions (N: 48)	Rank Order
Nursery retail	49	1
Professional	23	2
Environmental	10	3
Labour	10	3
Education	4	5
Managerial	4	5
TOTAL	**100**	**-**

Respondents stated too that wholesalers were not producing plants to suit the needs of retailers, that the wholesale distribution network was not as efficient as it could be and that wholesale prices were seen to be too high.

Problems and challenges listed under the professional category (23%) related to poor quality of plant material and indicated that an awareness of quality seemed to be non-existent. Many horticulturists concentrated on one aspect of horticulture (e.g. fynbos) and neglected others. The point was made that both the public and the industry required horticulturists to have a broader background. Salesmanship skills were generally lacking in horticulturists and greater emphasis on public relations was important.

Problems and challenges of an environmental nature (10%) related to water restrictions (and therefore gardeners were hesitant to purchase plants) and to recycling imperatives.

The need to educate the public in the importance of horticulture, conservation and environmental awareness was also mentioned.

Problems and challenges of a labour nature (10%) related to a lack of training, lack of experience and a lack of motivation of staff (low wages, few jobs and repetitive work were mentioned), but also to the difficulty of acquiring competent and experienced staff. For example, respondents expected all staff to be able to at least recognise a disease in their nurseries.

Declining profit margins and rising labour and production costs were mentioned under the managerial category.

5.4.7 Turf

A total of 42 different problems and challenges were raised by the two turf focus groups. These have been grouped into five categories and listed in rank order in Table 5.8.

TABLE 5.8: CATEGORIES OF PROBLEMS AND/OR CHALLENGES LISTED BY TURF FOCUS GROUPS

Categories of problems and/or challenges	% of total mentions (N : 42)	Rank order
Management/turf resources	60	1
Labour	17	2
Environmental	12	3
Professional	7	4
Education	4	5
TOTAL	**100**	**-**

The majority (60%) of problems and challenges raised by this sector related to issues of the management of turf resources. The relationship between the functioning of a horticulturist in this sector and the role of the supervisory body (e.g. greens committee) is of necessity a close one and problematic to the horticulturist. The most serious problems related to the "interference" horticulturists saw emanating from the committees, the difficulty they have in convincing committees of the technical reasons for certain practices and the concomitant budget restraints imposed because of a lack of understanding of the

need for these practices. Resources were generally limited, existing equipment was in poor condition and mechanical breakdowns were common.

While sporting facilities were generally over-utilized and club management generally exercised poor control over usage, horticulturists were expected to maintain facilities in superior condition with minimum resources and in limited time. The renovation of facilities often had to be executed while play continued and training facilities were expected to be of the same standard as match facilities. Theft of irrigation sprinklers and vandalism (e.g. of change-rooms and fencing) were commonplace.

Labour-related problems and challenges accounted for 17% of all mentions, relating particularly to the need for training of staff, low salary scales, labour union problems and a general lack of motivation.

Environmental problems and challenges (12%) related to difficult weather conditions, limited water supplies, growing grass unsuited for South African conditions, coping with the many pests, weeds and diseases and the need to conserve natural resources in every procedure applied to turf facilities and surrounds.

Problems and challenges of a professional (7%) and educational (4%) nature were that horticulturists working as greenkeepers felt that they were not given the appropriate recognition and while it was a challenge, it could be overcome by continuing professional development (CPD). Greenkeepers should also insist that greens committees take note of their status and of their professionalism. The institution of a variety of research initiatives should also be explored and funding provided for a scientific resolution of technical problems.

A summary and evaluation of the broader industry problems and challenges is discussed below.

5.4.8 Summary and evaluation of broader industry problems and challenges

A comparison of the highest ranked problems and challenges across the seven sectors and listed in the above paragraphs indicates that most sectors have many problems and challenges of a technical and/or professional nature. The following sectors indicated this

as their area of greatest concern: Arboriculture, Floriculture, Landscape, Nursery production and Nursery retail. Issues of a labour context were mentioned by three sectors as one of their three major priorities. Managerial issues and environmental issues were also listed by all sectors in one way or another. The difficulty in dealing with problem clients was mentioned by three sectors as a major problem. In the Amenity horticulture sector, this relates to problems of political interference in the execution of an official's duties.

The broad similarity of problems and challenges across sectors has been demonstrated in the paragraphs above. This research clearly indicates that despite many operational differences, the seven sectors of the industry face many comparable problems. There are more similarities than there are differences and this indicates that joint and co-ordinated efforts at resolving the problems and adapting to the challenges will be far more fruitful than a disjointed and sectoral effort. Curriculum writers need to focus on both sectoral and cross-sectoral problems and challenges. A simple truism is that qualifying students should be trained to be the innovative resolvers of the problems and challenges they encounter in their new careers.

5.5 CHANGES IN THE LAST TEN YEARS AND EXPECTED CHANGES IN THE NEXT FIVE YEARS

Respondents were asked to list the changes that they had experienced within their sectors over the last 10 years and also the changes they expected to see occur in the next five years. The research into changes experienced in the last 10 years overlapped significantly with anticipated changes in the next five years. The first led to the identification of sector-wide changes and the second mostly corroborated these where respondents saw most of these changes continuing into the next decade. As these two variables were found to be closely linked, they will therefore be discussed in tandem in the paragraphs below.

The discussion below focuses on the changes within sectors and deals with those anticipated would develop or continue to develop into the future.

5.5.1 Amenity horticulture

The respondents of the Amenity horticulture focus group mentioned experiencing the following changes in the last 10 years:

- The functioning of the municipal departments of parks and recreation has changed extensively over the last ten years. Horticulturists are no longer the curators of open space within defined city suburbs, but are now the managers of services outsourced to private contractors. Ornamental horticulture with its well-manicured beds and lawns has largely been replaced by a service delivery system that meets minimum needs only. A greater level of public involvement has been instituted and public/private partnerships have been established. Institutions have become more business oriented, although a great degree of political interference is still prevalent.
- A greater use of hard landscaping is utilised as a result of the high incidence of vandalism and other complaints arising from soft landscaped areas (e.g. mugging attacks).
- Greater use is being made of low maintenance plants, indigenous and water-wise landscaping, the sustainable use of resources and a strong environmental/ conservation focus.
- Horticultural budgets have been cut to the detriment of the profession and the environment. Much of this is seen as due to changes in political priorities and to less than aggressive marketing by the heads of parks departments.
- Labour has generally become better educated in terms of labour law, e.g. equity in employment, unionisation, strikes and other issues. Demands for redress are made and while these must be attended to, supervisors and staff lose much time in addressing these. Respondents stated that this has led directly to the lowering of standards in service delivery.
- Technological advances have brought about changes to all aspects of Amenity horticulture, e.g. computerisation, irrigation systems, equipment, mechanisation and fertilizer and chemical materials.

The above changes are expected to continue into the next decade. The following changes were also listed by respondents as changes one may expect in the future:

- Resources are expected to further diminish in the years ahead and greater privatisation of services can be expected. Volunteerism will also become increasingly important as both the public and the private sector are encouraged to assist in various ways (e.g. maintaining local parks). Horticulturists will be required to supervise and train contractors as well as volunteers. Every effort will have to be made to ensure that the quality of services is not lowered.
- Landscape designs will need to be more functional, sustainable and practical, particularly in view of vandalism, dumping, littering, crime, security and water restrictions. Soft landscaped areas will need to focus on trees and lawns, with less to no garden beds or shrubs. Centre islands should be gravelled, planted with trees and a limited use should be made of groundcovers. Sidewalks will be planted with evergreen trees only to avoid the need to sweep leaf litter. Deciduous trees will be planted in large parks only.
- Greater consideration to the needs of previously disadvantaged communities will have to be implemented with a greater public involvement and input.
- The demand by the public for additional and higher quality recreation amenities will expand despite an ever-lower level of priority in resource allocations (particularly for recreation).

Many changes have taken place in the Amenity horticulture sector over the past 10 years. The biggest changes have occurred as a result of financial stringencies, which have led to a lower level of service delivery and the outsourcing of municipal services. The emphasis currently being placed upon the use of maintenance-free landscapes, water-wise plants and a strong environmental focus is expected to continue into the future. Resources will remain restricted and horticulturists will not only have to do more with less, but will have to improve service delivery by innovative methods, e.g. community participation and volunteerism. Horticulturists entering this sector will have to be trained to deal with these particular challenges.

5.5.2 Arboriculture

Respondents of the Arboriculture focus group mentioned the following changes in the last 10 years:

- There is an increased demand for instant plant material, particularly for large trees.

- A greater awareness of protected trees exists.
- An increase in the use of indigenous and water-wise plantings is widely accepted.
- South Africa has still to experience the emphasis on research into safety and tree care that is found overseas.
- The industry is slowly becoming more professional as it grows and expands in demand. Service standards have increased.
- The public has a bias towards home improvements, which includes tree planting and tree care.

While the above changes are expected to continue, the following changes are also expected into the next decade:

- Regular inspections of all trees, both public and private will become mandatory for safety reasons. Standards of safety, for example in pruning, will be legislated.
- Pruning standards will be developed for the propagation and development of nursery trees.
- Greater awareness of alien plants and invaders will exist as well as measures to eradicate them.
- Municipalities will increasingly be outsourcing the maintenance of all their street and park trees.

Respondents were of the opinion that the emphasis being placed nationally upon the greening of urban environments will lead to greater regulation to protect urban trees. This will affect the removal, pruning and even the planting of trees on private and on public property.

5.5.3 Floriculture

Respondents of the Floriculture focus group mentioned the following changes in the last 10 years:

- The distribution of cutflowers has changed, as it has moved from the auction floor at Multiflora in Johannesburg to direct marketing by growers to retailers.
- Alliances have developed between producers and retailers that are mutually beneficial.

- The export market has opened up and local growers are exporting to overseas markets.
- Quality standards have improved and are continually being further improved.
- The number of smaller retailers is being reduced.
- Effective promotions and marketing drives have been initiated both locally and overseas.

The above changes will continue and the following changes can be expected in the next decade:

- Producers will further concentrate on the export market.
- A greater drive to automate and to save on labour costs is expected.
- Quality assurance mechanisms will be further developed and refined.

Respondents in this sector consider the marketing and export of their products to be the arena where most change is taking place and also where most future change is expected.

5.5.4 Landscape

Respondents of the Landscape focus group mentioned experiencing the following changes in the last 10 years:

- There has been a change in general focus in landscaping from high maintenance exotic style gardens to indigenous water-wise gardens that are sustainable.
- A major reason for the growth in the landscape and maintenance market has occurred as a result of the privatisation of projects by both corporate business and the state.
- Many smaller companies have disappeared to be replaced by larger companies that offer combined services (e.g. indoor plant companies who clean windows).
- The industry has become more technical, professional and more of a science and has accordingly become a well-established sector in the construction marketplace. Greater specialisation also exists as segments of the market have been identified and explored. Quality standards in the industry have also improved.
- The landscape irrigation industry has grown in the last 10 years, including the establishment of the Landscape and Irrigation Association (LIA). The irrigation

product range has increased and improved with *inter alia* designs being done by computer packages.

- The scale of projects being undertaken has in the recent past changed to large high profile projects requiring instant effect plantings. Less money is currently available for municipal projects.
- The increased competition in the industry has led to companies tendering for all new projects where meeting deadlines is critical to survival. Despite this, many underskilled operators have tendered for landscape design and maintenance projects and are lowering standards in the industry because of low budgets and poor expertise.
- The Internet has "shrunk" the world in terms of information, particularly useful in designs and product knowledge.
- Recent labour legislation has affected the management of landscape companies in both their daily operation and their tendering for projects with equity clauses.

The above changes to the industry are expected to continue into the next decade. Respondents of focus groups representing this sector also listed the following:

- Rehabilitation projects will receive a greater segment of the landscape market where ecologically sensitive designs will take precedence.
- An increasing emphasis will be placed on maintenance projects as opposed to design and construction projects.
- More projects will be community based and will be premised upon partnerships with the community.
- Costing calculations will have to be determined with greater precision as competition further increases.
- Irrigation systems will become more "water conservation based" and the use of complex centrally controlled irrigation systems will become commonplace.
- Legislation is continually changing, forcing landscape companies to change their foci.
- Inconsistencies in landscape standards will have to be corrected and general agreement on quality measures fixed.

Respondents in the Landscape sector consider it to be a sector undergoing great changes in many areas of its operations. The competition between companies and the demand for

specialised services (eg. water-wise landscapes, maintenance projects, rehabilitation projects) is seen as increasing. With the current development of quality standards of delivery, one may safely assume that many more changes in this sector will occur as the sector adapts to new demands.

5.5.5 Nursery production

Respondents of the Nursery production focus groups mentioned that the following changes had been experienced in the last 10 years:

- The demands of clients were seen to have changed in the following ways: smaller plants are required for the many townhouse gardens; full-grown plants were required for instant effects; greater interest exists in new varieties; greater interest exists in environmentally friendly plants (water-wise, indigenous) and functionality of plants was more important than simple beautification.
- The wholesale market has changed from the earlier ratio of 60:40 to 30:70 for retail: landscape, i.e. many small landscape companies have developed who provide landscape services to home-owners where the latter bought their own plants in the past.
- Recent labour legislation has led to changes in industrial relations, particularly greater unionization, greater use of contract labour, a drastic cutback on unskilled labour and an emphasis on training.
- An increasing use of mechanised and other labour saving devices and methods has become essential due to labour shortages and unskilled labour.
- Fewer propagators are in employ in the industry. A general downscaling has also been noted from the large companies (big generalists) to the smaller specialist growers. Urban sites are too expensive for start-up propagators and smallholdings in peri-urban areas with available water being used for production nurseries.
- The increasing popularity of prospecting of South African plants by overseas nurserymen was seen as a mixed blessing, having advantages for South Africa as long as this country was not exploited.

Respondents again stated that they expected to see the above changes continuing into the next decade. The following were listed by the respondents as expected changes:

- The scarcity of water is seen as worsening in the future and nurserymen will have to learn to add value to their marketing and to adapt to a water-wise approach.
- Municipal horticulturists will not be propagating plants in future and will maintain holding nurseries only.
- State funding of research into plant selection and breeding will diminish and other sources of revenue for this research will have to be found.
- The development of overseas markets will be further developed as specialist growers capitalize on the local and overseas markets.

Respondents regard the most serious changes to be those linked to the changing markets. This is an important phenomenon to the Nursery production sector because it usually takes investors several years to recoup their money (once plants are of a saleable size) and this investment is in jeopardy when markets fluctuate.

5.5.6 Nursery retail

Respondents of the Nursery retail focus groups mentioned experiencing the following changes in the last 10 years:

- Retail nurseries have been compelled to diversify from plant outlets to garden centres (and increasingly to lifestyle centres) where a variety of products are sold. The latter could include pony rides, playparks, talkshows and restaurants and should be geared to "have lots to do".
- Customers have developed an acute consciousness of the quality of the plants and other products purchased, of styles of gardening and of the range of products available. Be these irrigation products, fertilizers or chemicals, they expect to see them on the shelves. Retail nursery managers have had to develop a greater customer orientation. It was also mentioned that purchases are more impulse- and market-driven.
- Retail nurseries have changed from being family businesses to corporate businesses. They have also become more professional in their approach, where mechanisation and computerisation are the norm.

All the above changes were seen to be continuing trends for the future. The following expected changes were also listed:

- Touch-screen computers will be placed in nurseries to assist customers in selecting plant material. This may lead to fewer horticulturists required on site.
- Greater specialisation will develop within the Retail nursery sector. For example, one may expect a horticulturist to contract with three or four nurseries to do all of their pest and disease spraying.
- Rigid containers (as opposed to plastic bags) will be exclusively used, plant quality standards will increase and higher standards of merchandising will become the norm.
- A greater emphasis on environmental awareness (e.g. recycling, biodiversity, sustainability, less use of chemicals), use of indigenous/water-wise plants and conservation will become standard practice.
- Greater public spending on nursery products is expected, as gardening becomes an ever-increasingly popular hobby and pastime.

Respondents were optimistic about the future of the nursery trade, though the current move to diversification is expected to continue in the future. Nursery retailers are going to have to be sensitive to market demands as the public increasingly regard retail nurseries as lifestyle centres.

5.5.7 Turf

Respondents of the Turf focus groups mentioned the following changes in the last 10 years:

- Greenkeepers have become more professional in their approach as they themselves have improved their qualifications, have become more research focused and as new products, greater mechanisation, computerisation and technologies have advanced the state of the art within the turfgrass industry.
- The expansion of professionalism within the sporting fraternity has led directly to an increase in the quality standards of turf facilities as well as the availability of funding to support this demand. This demand has led to increased expectations of players, administrators and spectators on all levels at which sport is played.
- The emphasis has changed from preventative maintenance to curative measures, i.e. a change to greater use of biological/sustainable measures.

- New grass varieties have been introduced which have been bred to meet specific needs (e.g. to withstand traffic and disease stress).
- Changes in labour legislation have led to a greater emphasis on industrial relations, unionisation, staff training and labour issues. The training of supervisors, operators and labour was particularly important and was receiving attention by most employers in the turfgrass sector, though it was stated that much still needed to be done.
- Water shortages are an increasing concern and greater use will have to be made of effluent water.

All the above changes were seen as continuing into the next decade. The following were also listed as expected changes:

- South Africa will need to make every effort to keep up with technological advances occurring elsewhere in the world. The emphasis on a scientific approach to problem-solving was seen as critical. Research will have to be geared to local environmental conditions as well as to national and international applications.
- A greater environmental focus in all operations will increase in importance, e.g. the growing of indigenous grasses, much less use of harmful chemicals, use of good quality water resources and the preservation of natural resources on sporting estates.
- Operations will become less labour intensive as further mechanisation of routine tasks is implemented. Staff complements will become smaller, though staff will become better trained. Privatisation and sub-contracting of services will continue. All operations will become more streamlined as efficiency becomes a watchword. Greenkeepers can expect to receive greater recognition for a professional approach.

Respondents were unanimous that the major change occurring in this sector was that the public increasingly expected a high standard in the provision and maintenance of sporting and recreational facilities. All staff in this sector will be expected to demonstrate a high level of proficiency.

5.5.8 Concluding comments on changes in the last 10 years and expected changes in the next five years

The changes that have taken place across the seven sectors of the horticulture industry are varied and to a large extent are sector specific. Those respondents operating in the public sector felt that the biggest changes affecting their sectors have occurred as a result of financial stringencies. This has led to a lower level of service delivery, but also to the increasing use of maintenance-free landscapes, water-wise plants and a strong environmental focus. These are expected to continue into the future. Respondents in the Arboriculture sector were of the opinion that a great variety of regulations to protect urban trees must be expected as a result of the emphasis being placed nationally upon the greening of urban environments. Respondents in the commercial sectors, particularly Floriculture, Nursery production and Nursery retail sectors, considered the marketing and export of their products to be the most important areas where change may be expected to occur, both at present and in the future. With the current development of quality standards of delivery in the Landscape sector, respondents felt that one may safely assume that many more changes in this sector will occur as the sector adapts to the new demands (e.g. water-wise landscapes, maintenance projects, rehabilitation projects). The change in the gardening market was highlighted by the nursery sectors. The demand by the public for nursery products is largely influenced by the economy and by changing fads. The importance accorded an environmental focus is reflected in the purchasing of indigenous plants that are hardy and adapted to local environments. The purchase of annual plants is expected to diminish drastically.

Respondents in the Nursery production sector regarded fluctuating markets as an important phenomenon because investments are held up, as growing stock has to mature over several years. Respondents believed that the diversification in the Nursery retail sector would continue in the future and that retail nurseries would increasingly become lifestyle centres. Respondents were unanimous that the major change occurring in this sector was that as a result of the public's demand for first-class sporting facilities, horticulturists will be expected to maintain these to the highest standards.

This research has identified the changes in the last 10 years as well as those anticipated to occur within the next five years. This has served the important function of identifying

those aspects within each sector that should be borne in mind in the development of curricula for those studying towards a career in horticulture.

5.6 CONTEXTUAL FRAMEWORK

Focus group participants were asked to state what they considered the contextual framework of their sector to be (i.e. what key aspects are special to and define the particular sector of horticulture). The reason for including this question was to enable the researcher to identify the most encompassing contextual definition for each sector.

It also enabled the researcher to affirm that each respondent within the seven sectors conceptualised the function of that sector in a similar way. In most cases responses received represented the particular niche where respondents were currently employed.

Listed below are one or two contextual definitions for each sector, selected from the various responses of each focus group and in some cases a combination of two or three responses.

5.6.1 Amenity horticulture

"Delivery of an equitable and on-going public service which is aimed at improving the quality of urban life through the provision of public open space which serves recreational, sporting, conservation and athletic functions"

5.6.2 Arboriculture

"The propagation, preservation and care of woody plants for human well-being and pleasure"

5.6.3 Floriculture

"To implement techniques of propagation, growing, harvesting, post-harvesting, marketing and selling of cut-flowers for commercial purposes"

5.6.4 Landscape

"A business oriented service provider aimed at improving the environment with the use of plant and other construction materials, including the design, conservation, construction and maintenance of residential, public and commercial landscapes to client expectations"

5.6.5 Nursery production

"To produce top quality plants on large scale, to market, to sell and to distribute them wholesale to retailers and landscapers"

5.6.6 Nursery retail

"Sell plants and garden accessories and provide a service and advice to customers" or "Customer service is the backbone of the industry: Not selling plants but a dream, i.e. what the client's garden can become. It is about experience first, buying plants second!"

5.6.7 Turf

"To prepare and maintain to the highest possible standard and functionality, turf areas appropriate to specific sports and recreational activities".

The identification by focus group participants (or respondents) of comparable contextual frameworks for each sector served primarily as a means of ensuring the reliability of the study. The question the researcher was posing was simply: "Are respondents in agreement as to the context of specific sectors?" Those listed above are regarded as the most concise and accurate.

5.7 IDENTIFICATION OF FIELDS OF LEARNING

Respondents were requested in this question (see Question 6, Table 3.2) to "identify the overall skills (also called core skills or competencies), which are typical of a horticulturist working in this sector of horticulture". Respondents were asked to think broadly so that they identified approximately seven core skills. The example quoted to facilitate uniform understanding was that of propagating plants, which is an overall or core skill and

comprises many specific skills. The reason for including this question and furthermore for the length of time set aside for it at the focus group discussions, relates directly to this question lying at the centre of the situational analysis. The researcher was trying to answer the question: "What do horticulturists do when they work in any one of the seven identified sectors?" The proposed curriculum that is to be based upon this study will be founded upon the fields of learning identified in this research. The overall or core skills referred to in the schedule relate to fields of learning. The latter term is seen as more encompassing than core or overall skills/competencies. One of the fields of learning identified by the Nursery production sector was "marketing" and in this term, which refers to a whole discipline, much more could be assumed. The term *fields of learning* will be used in all discussions of the research results, but should be simply seen as a summation of the meaning respondents have accorded the terms *core* or *overall skills/competencies*. (The first letter only of each field of learning will be denoted in capital letters.) It should be noted that the researcher's use of the term *fields of learning* has not been an attempt to emulate the terms *fields* and *sub-fields of learning* as used by SAQA. Any overlap in meaning is considered to be coincidental as NSBs and SGBs will "define the boundaries of discrete fields" and will "identify discrete sub-fields" (Du Pré, 2000: 21). These bodies have not yet completed their work and their identification of fields of learning should not be presupposed.

At the focus group meetings, participants were each asked to name the core skills/competencies (i.e. fields of learning), which they had identified on the schedule and also to mention any others that came to mind during the discussions. These were written by the researcher onto a transparency sheet (with the overhead projector on) so that all the participants could see the development of the group's composite list of fields of learning for that particular sector. Once a complete list had been generated (normally between four and 10 fields of learning), participants were asked to individually place these in priority sequence and to give each a percentage ranking in terms of the importance of each in "curriculum time" (i.e. how much of the curriculum should be spent on each field of learning). As mentioned in Paragraph 3.4.2.8, this exercise served to produce a "product" of the day's deliberations as each focus group concluded with a priority ranking of their sector's fields of learning.

5.7.1 Fields of learning identified by focus groups and their aggregation

The fields of learning identified by the 14 focus groups as well as the specific skills for each field of learning were comprehensively listed. An aggregation of the fields of learning, together with the specific skills/competencies that were identified by the different focus groups within each of the seven sectors is indicated in full in Appendix 5.1. A comparison of the fields of learning identified by the focus groups in each sector is tabulated in Tables 5.9 to 5.15 (note that the Arboriculture and Floriculture sectors had one focus group each). The aggregate division of the fields of learning has been based upon the researcher's estimation of what an aggregate across the different focus groups per sector would be and is not a simple mean calculation. Certain fields of learning have also been combined with others where this was considered appropriate.

The following paragraphs present the tabulated lists of the fields of learning identified by each focus group as well as the researcher's estimated aggregation of these, so that a single list of the fields of learning for each sector is listed against the list for each focus group. A short discussion of the rank order and the importance allocation given to each aggregated field of learning is provided for each sector.

At the conclusion of each paragraph, a synopsis of the research results for each sector will be provided. This will be based upon the core skill/competencies identified by participants and will be aimed at giving the reader a broad understanding of the primary functions of a horticulturist working in each sector.

5.7.1.1 Amenity horticulture

Table 5.9 below indicates that the Amenity horticulture focus groups place Management (24%) as the most important field of learning, followed by Horticultural skills (19%), Plant knowledge (15%) and Communication (12%). Of lesser importance were Environmental management/conservation (18%), Landscape (8%), Community recreation (7%) and Contracts/project management (7%).

Participants from this sector stated that they experienced that their responsibilities were largely managerial and while horticultural skills were still important, the level of horticultural expertise required of their positions was diminishing. Horticulturists in this sector regarded

themselves as generalists as they were required to be knowledgeable of many fields related to the provision of environmental services in a public service context. As they usually found themselves working in multidisciplinary teams, Communication and Environmental management were regarded as important.

TABLE 5.9: FIELDS OF LEARNING IDENTIFIED BY AMENITY HORTICULTURE FOCUS GROUPS, INDICATING % IMPORTANCE ALLOCATIONS

Fields of learning	Allocation of % importance by focus groups			Estimated aggregated division	Rank order
	Focus group A	Focus group B	Focus group C		
Management	20	31	21	24	1
Horticultural skills	25	12	32	19	2
Plant knowledge	18	14	-	15	3
Communication	10	14	12	12	4
Environmental management/conservation	12	8	-	8	5
Landscape	5	11	-	8	5
Community recreation	-	10	-	7	7
Contract/project management	-	-	10	7	7
Community development	-	-	16	-	-
Turf management	10	-	-	-	-
Urban/spatial planning	-	-	9	-	-
TOTAL	100	100	100	100	

5.7.1.2 Arboriculture

The single focus group representative of the Arboriculture sector identified the fields of learning as indicated in Table 5.10:

TABLE 5.10: FIELDS OF LEARNING IDENTIFIED BY THE ARBORICULTURE FOCUS GROUP, INDICATING % IMPORTANCE ALLOCATIONS

Fields of learning	Focus group allocation (%)	Rank order
Arboricultural skills	36	1
Management	26	2
Education/training	16	3
Environmental	14	4
Arboriculture and the law	8	5
TOTAL	**100**	-

This focus group comprised 11 members and was therefore considerably larger than most other focus groups. The identification of the above five fields of learning was debated at some length and in conclusion the group stated that the broad field of learning of Arboricultural skills (36%) was to include all aspects of horticulture which arborists would need to know (e.g. tree biology, propagation, plantings, fertilisation, irrigation) as well as tree surgery, bracing and cabling and other strictly arboricultural skills. A distinction was seen between arboricultural skills/competencies of a technical and a biological nature. Management (26%), Education/training (16%) and Environmental (14%) were also seen as important.

Participants representative of this sector were mostly hands-on arborists and were keenly aware of the technical nature of most skills/competencies within Arboriculture. They believed that horticulturists were not taught these as is done in most European countries. The public was also seen as being largely ignorant of arboricultural principles. The education and training of both employees and the public was mentioned as an essential skill/competency, which they regarded as their responsibility.

5.7.1.3 Floriculture

As the floricultural industry in the Western Cape is not extensive and does not employ many horticulturists, only one focus group was utilised (six participants). The fields of learning identified by this focus group are listed in Table 5.11.

TABLE 5.11: FIELDS OF LEARNING IDENTIFIED BY THE FLORICULTURE FOCUS GROUP, INDICATING % IMPORTANCE ALLOCATIONS

Fields of learning	Focus group allocation (%)	Rank order
Plant knowledge	35	1
Management	14	2
Soil science	13	3
Economics and marketing	10	4
Pest, weed and disease management	8	5
Harvesting and post-harvesting	7	6
Technical knowledge	7	6
Communication skills	6	8
TOTAL	100	-

Plant knowledge (35%) was seen as by far the most important field of learning, including all aspects from plant physiology, anatomy, taxonomy to applied cultivation techniques. Management specific to Floriculture was also important (14%), as were Soil science (13%) and Economics and marketing (10%). Communication (6%) was given the least importance allocation.

Participants in this focus group highlighted the expertise that is commonly associated with floriculture. It was mentioned that very little expertise of the level one associates with the Dutch flower growers is available in South Africa and that this should receive serious attention.

5.7.1.4 Landscape

The three focus groups identified a range of different fields of learning. However, where similar fields were identified by different focus groups, a comparatively similar percentage allocation was given. In certain fields of learning, some participants believed that these should be placed elsewhere, e.g. Irrigation as a field of learning was also placed in Landscape design and Landscape construction.

The researcher has again aggregated the responses across the three focus groups to obtain a single estimated aggregated percentage allocation per field of learning. This is indicated in Table 5.12.

The most important field of learning identified almost uniformly by the Landscape focus groups was that of Horticultural skills (29%). Focus group A indicated this as 43%, but included Irrigation and part of Landscape construction in it. Management (18%) was also seen by all of the groups as being very important. The fields of learning of Landscape construction and Landscape design were also seen as central to this sector. Focus Group B raised the importance of landscape maintenance as a separate field of learning, but the other groups believed that it forms part of Horticultural skills.

The fields of learning identified by the three landscape focus groups may be broadly divided into Horticultural skills, Management and Landscape design and construction. It is noteworthy that participants regarded Horticultural skills as the most important and this

underlines the importance of the latter before one undertakes the landscaping of gardens, parks or other areas.

TABLE 5.12: FIELDS OF LEARNING IDENTIFIED BY LANDSCAPE FOCUS GROUPS, INDICATING % IMPORTANCE ALLOCATIONS

Fields of learning	Allocation of % importance by focus groups			Estimated aggregated division	Rank order
	Focus group A	Focus group B	Focus group C		
Horticultural skills	43	19	29	29	1
Management	22	17	14	18	2
Landscape construction	-	18	13	16	3
Landscape design	21	15	13	14	4
Communication	-	10	8	9	5
Logistics/equipment	-	10	14	8	6
Irrigation	-	-	9	6	7
Human resources management	14	-	-	-	-
Maintenance	-	11	-	-	-
TOTAL	100	100	100	100	-

5.7.1.5 Nursery production

Two focus groups represented the Nursery production sector, both of which listed similar fields of learning and gave fairly parallel percentage importance allocations. These are listed in Table 5.13.

Table 5.13 indicates that Management was regarded as the single most important field of learning (21%). Propagation (14%), Cultivation/growing skills (12%) and Plant knowledge (12%) are complementary fields of learning, forming 38% of the total and clearly a key area in this sector. All fields of learning were seen as critically important, e.g. the lowest allocation in importance was Irrigation (5%), which is central to any Nursery production enterprise.

The learning of horticultural skills, which are specific to this sector, i.e. Propagation, Cultivation/growing, Plant knowledge and Pest, weed and disease management lie at the heart, not only of this sector, but of the horticulture industry. Participants stated that the *production* of plants, whether for the retail, the landscape or any other sector, is the

foundation of the horticultural industry. The importance of the basic propagation skills was highlighted by most focus groups, but particularly by the Nursery production sector.

TABLE 5.13: FIELDS OF LEARNING IDENTIFIED BY NURSERY PRODUCTION FOCUS GROUPS, INDICATING % IMPORTANCE ALLOCATIONS

Fields of learning	Allocation of % importance by focus groups		Estimated aggregated division	Rank order
	Focus group A	Focus group B		
Management	23	18	21	1
Propagation	13	17	14	2
Cultivation/growing skills	-	18	12	3
Plant knowledge	27	-	12	3
Marketing	8	12	10	5
Pest, weed and disease management	12	8	10	5
Communication	11	5	8	7
Nursery development and maintenance	6	13	8	7
Irrigation systems	-	9	5	9
TOTAL	**100**	**100**	**100**	**-**

5.7.1.6 Nursery retail

In their discussions, Focus group A came up with the term *Plant management* and to which they accorded 48% of their importance allocation. The group saw in this term an encapsulation of anything to do with managing plants (from a Nursery retail perspective), including the skills/competencies of plant knowledge, nutrition, soil geology, climatology, propagation, construction, machinery and landscape design. They clearly see two major fields of learning, viz. Plant management and Management (which includes communication and marketing). In the determination of an estimated aggregate division across both focus groups, the researcher preferred Focus group B's division of their fields of learning as these would be used in the mail questionnaire survey to follow and would be easy to understand. While plant management is a useful and encompassing term, it will always need further elucidation.

The most important field of learning identified by the Nursery retail focus groups was Plant knowledge (23%), followed by Retailing (20%), Management (15%), Plant protection (13%) and Communication (10%) with a ranking of 5 out of 8. The lowest ranked field of

learning, Landscape (5%) was seen as an aspect "useful to have" because "retailers have to advise clients on their gardens".

TABLE 5.14: FIELDS OF LEARNING IDENTIFIED BY NURSERY RETAIL FOCUS GROUPS, INDICATING % IMPORTANCE ALLOCATIONS

Fields of learning	Allocation of % importance by focus groups		Estimated aggregated division	Rank order
	Focus group A	Focus group B		
Plant knowledge	-	24	23	1
Retailing	-	20	20	2
Management	15	21	15	3
Plant protection	-	14	13	4
Communication	20	-	10	5
Soil science	-	9	8	6
Environmental	-	7	6	7
Landscape	-	5	5	8
Marketing	17	-	-	-
Plant management	48	-	-	-
TOTAL	**100**	**100**	**100**	**-**

Respondents regarded the functions of a horticulturist operating in the retail nursery sector as that of being a manager firstly, of plants and secondly, and as important, of employees, suppliers (growers) and clients. They did not think that a horticulturist needed to be an expert in any specific aspect of horticulture, that most of his use of these skills would be on an advisory basis (clients visiting nurseries, it was believed, have generalized questions only) and that he/she should rather concentrate on the retail management of resources. It was believed that this was especially the case where a horticulturist was employed in a senior position.

5.7.1.7 Turf

The two Turf focus groups differed in their division of fields of learning in that Focus group B identified Environmental management and Soil science as separate and independent fields of learning and Focus group A placed these fields under Horticulture. Primary and secondary cultural practices were included by Focus group B under Agronomy. The researcher's estimated aggregated division of the fields of learning has tried to represent

both focus groups as indicated in Table 5.15. The term Agronomy is preferred to the term Horticulture for the specified skills/competencies listed under these two terms because it is more representative of the soil and crop "agronomic" skills/competencies in this sector.

TABLE 5.15: FIELDS OF LEARNING IDENTIFIED BY TURF FOCUS GROUPS, INDICATING % IMPORTANCE ALLOCATIONS

Fields of learning	Allocation of % importance by focus groups		Estimated aggregated division	Rank order
	Focus group A	Focus group B		
Management	19	21	20	1
Agronomy/horticulture	24	16	19	2
Irrigation	12	12	12	3
Pest, weed and disease control	10	14	12	3
Environmental management	-	14	10	5
Soil science	-	13	10	5
Mechanisation	8	10	9	7
Construction of sports fields	8	-	8	8
Primary cultural practices	10	-	-	-
Secondary cultural practices	9	-	-	-
TOTAL	**100**	**100**	**100**	**-**

The most important fields of learning were those of Management (20%), Agronomy/horticulture (19%), Irrigation (12%) and Pest, weed and disease control (12%). While Mechanisation (9%) and Construction (8%) were seen as less important, both fields of learning encompass essential skills/competencies in the turf sector.

The primary responsibility of horticulturists operating in this sector is to grow grass to the highest quality standards. This is determined by the requirements of the specific sport type using that surface and by the expectations of the sporting fraternity using those surfaces. This responsibility requires that horticulturists should primarily be fully trained in the specific technologies applicable to growing grass and secondly they should be capable of managing a broad range of construction and maintenance resources.

In the following paragraph, the fields of learning discussed above will be tabulated according to the sectors in which they were identified. This will enable the researcher to

present a broad overview of the fields of learning, in which fields of learning that are common to different sectors are distinguished. The relevance thereof to this study is that those fields of learning that are of general importance are brought to the fore and their relative importance in a curriculum for horticulture is clearly shown. Where commonality across sectors is shown, general modules or unit standards may be developed.

5.7.2 Comparison of fields of learning across sectors

A list of the 25 fields of learning is tabulated overleaf in Table 5.16. This indicates which sectors identified specific fields of learning, e.g. Management was listed by focus groups representing each of the seven sectors. The following five fields of learning were mentioned by four or more sectors: Plant knowledge, Plant protection, Environmental management, Management and communication. A total column in Table 5.16 indicates the total response per fields of learning, across all sectors. The rank order listing in Table 5.16 indicates that the 10 fields of learning given the highest importance rating were of; Management (19,8%), Plant knowledge (12,2%), Horticulture (6,9%), Communication (6,4%), Plant protection (6,1%), Environmental management (5,4%), Arboriculture (5,1%), Soil science (4,4%), Landscape construction (3,4%) and Irrigation (3,3%). The least important fields of learning, all with a similar percentage rating (1,0%) were Harvesting and Post-harvesting, Technical knowledge (Floriculture), Contracts management and Community recreation.

The identification of the relative importance of the different fields of learning (also to each sector) serves the purpose of informing the curriculum writer of the credit weighting that should be given to specific fields of learning and as applied to each sector.

In the following paragraph, the fields of learning discussed in Paragraph 5.7.1 will be clustered into the two broad categories of horticultural and managerial. The clear differentiation between fields of learning of a horticultural as opposed to a managerial nature is apparent when the fields of learning identified by the different sectors are compared. It is a reality of the horticulture industry that graduates on their first job are soon expected to employ more than their purely horticultural skills. These additional responsibilities relate to the management of human, financial, transport and other resources. This differentiation is important in the development of a curriculum that is relevant to the needs of the industry.

TABLE 5.16: SUMMARY OF FIELDS OF LEARNING PER SECTOR AS IDENTIFIED BY FOCUS GROUPS (%)										
Fields of learning	**Amenity hrt**	**Arboricultre**	**Floriculture**	**Landscape**	**Nurs prod**	**Nurs ret**	**Turf**	**Total**	**Rank**	**%**
Management	24	26	14	18	21	15	20	138	1	19,8
Plant knowledge	15		35		12	23		85	2	12,2
Horticulture	19			29				48	3	6,9
Communication	12		6	9	8	10		45	4	6,4
Plant protection			8		10	13	12	43	5	6,1
Environmental management	8	14				6	10	38	6	5,4
Arboricultural		36						36	7	5,1
Soil science			13			8	10	31	8	4,4
Landscape construction				16			8	24	9	3,4
Irrigation				6	5		12	23	10	3,3
Economics and marketing			10		10			20	11	2,9
Retail management						20		20	11	2,9
Agronomy							19	19	13	2,7
Equipment /mechanization				8			9	17	14	2,4
Education/training		16						16	15	2,3
Landscape design				14				14	16	2,0
Propagation					14			14	16	2,0
Landscape	8					5		13	18	1,9
Cultivation/growing					12			12	19	1,7
Arboricultural law		8						8	20	1,1
Nursery development					8			8	20	1,1
Community recreation	7							7	22	1,0
Contracts management	7							7	22	1,0
Harvesting and post-harvesting			7					7	22	1,0
Technical knowledge			7					7	22	1,0
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**700**	**-**	**100**

5.7.3 Clustering of fields of learning into horticultural vs managerial

In an attempt to determine to what extent focus group participants placed emphasis on the horticultural as opposed to the managerial fields of learning, the researcher clustered the aggregated responses obtained for each sector (Paragraph 5.7.1 above) into these two clusters of fields of learning. Table 5.17 lists the fields of learning of all sectors where these have been grouped into either horticultural or managerial.

It was mentioned in Paragraph 3.4.2.3 above that respondents with varying years of experience were selected as focus group participants. Some of these were in more senior positions where they had a greater level of managerial responsibilities compared to those with junior positions. Cursory inspection of Table 5.17 indicates that the general or aggregated opinion on the relative importance of managerial as opposed to horticultural responsibilities is approximately 40:60 across all sectors. A generalized relationship in terms of these two divisions of responsibility between all sectors and representative of horticulturists of all levels of seniority is therefore indicated by this ratio.

TABLE 5.17: COMPARISON OF MANAGERIAL VS HORTICULTURAL FIELDS OF LEARNING (%)

Sectors	Clustered fields of learning	
	Managerial	Horticultural
Amenity horticulture	43	57
Arboriculture	42	58
Floriculture	30	70
Landscape	27	73
Nursery production	39	61
Nursery retail	45	55
Turf	20	80

A total of 25 distinct fields of learning were identified by the 14 focus groups. These have been fully listed in Table 5.18, under the Management (37,3%) and Horticultural (62,7%) clustered fields of learning. The three sectors which indicated the greatest importance to horticultural fields of learning were Turf (80%), Landscape (73%) and Floriculture (70%) and the greatest importance to managerial fields of learning were Nursery retail (45%), Amenity horticulture (43%) and Arboriculture (42%). This table indicates that the

relationship between managerial and horticultural responsibilities in terms of importance in the curriculum is 37,3:62,7.

The exposition in this paragraph (5.7) of the fields of learning as identified by the focus groups representative of each sector, has served to provide the study with a foundation for determining the core skills/competencies (i.e. fields of learning) required of a horticulturist working in any one of the seven sectors. These have been rank-ordered so that the relative importance of each field of learning could be ascertained. They have also been clustered into those fields of learning of a horticultural as opposed to a managerial nature. The identification of the commonality across sectors as well as the importance rating of each will aid the curriculum writer and has been the reason for including this question as a primary focus of the focus group discussions. The identified fields of learning will also form a central component of the mail survey that follows the focus group interviews.

Following the above identification by each sector of the different fields of learning, the paragraph below presents the specific skills/competencies, which make up the broader core skills/competencies or fields of learning.

5.8 IDENTIFICATION OF SPECIFIC SKILLS/COMPETENCIES

Following the identification by individual focus groups of a set number of fields of learning, participants were asked to list as many specific skills under each of these. The researcher wrote these on overhead transparencies (as was done for the identification of fields of learning) and many additional specific skills were identified as participants called out the skills that came to mind and so triggered others to think of further skills. Participants had their completed questionnaires before them and were able to refer to their earlier notes as well. From this the researcher prepared a comprehensive list of specific skills for each field of learning. These were listed as complete listings per individual focus groups, as well as per sector, i.e. where more than one focus group represented a sector, a joint listing per sector was prepared and is attached as Appendix 5.1. It is the latter which will be particularly useful to curriculum writers as a high degree of specificity has been achieved.

Further discussion on the identification of specific skills has been deferred to Chapter 6 where an evaluation will be done of the specific skills identified by both the focus groups as well as the mail questionnaire.

TABLE 5.18: SUMMARY OF CLUSTERS OF FIELDS OF LEARNING PER SECTOR INDICATING % IMPORTAMCE ALLOCATIONS AS IDENTIFIED BY FOCUS GROUPS										
Clusters of fields of learning	**Fields of learning**	**Amenity horticulture**	**Arbori-culture**	**Flori-Culture**	**Land-scape**	**Nursery production**	**Nursery retail**	**Turf**	**Total**	**Total cluster %**
1. Horticulture	Plant knowledge	15		35		12	23		85	
	Soil science			13			8	10	31	
	Horticulture	19			29				48	
	Propagation					14			14	
	Cultivation/growing					12			12	
	Agronomy							19	19	
	Arboriculture		36						36	
	Harvesting and post-harvesting			7					7	
	Technical knowledge			7					7	
	Nursery development					8			8	
	Plant protection			8		10	13	12	43	
	Environmental management	8	14				6	10	38	
	Landscape	8					5		13	
	Landscape design				14				14	
	Landscape construction				16			8	24	
	Irrigation				6	5		12	23	
	Equipment/mechanization				8			9	17	
	TOTAL	**50**	**50**	**70**	**73**	**61**	**55**	**80**	**439**	**62,7**
2. Management	Management	24	26	14	18	21	15	20	138	
	Economics and marketing			10		10			20	
	Retail management						20		20	
	Contracts management	7							7	
	Communication	12		6	9	8	10		45	
	Education/training		16						16	
	Community recreation	7							7	
	Arboricultural law		8						8	
	TOTAL	**50**	**50**	**30**	**27**	**39**	**45**	**20**	**261**	**37,3**
	TOTAL	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**700**	**100,0**

5.9 CATEGORISATION OF SKILLS WITH WHICH HORTICULTURISTS STRUGGLE

The question to participants at the focus group interviews that they identify those skills or aspects of the job with which recently qualified horticulturists struggle, was aimed at identifying the deficiencies in existing courses. Respondents were asked to rank these from 1 to 5 in importance. While 281 skills or aspects were mentioned and these were listed in the summary sheets for each focus group, these have been grouped into 20 different categories and listed in rank in order in Table 5.19. The percentage "mentions" within each category is also shown in brackets.

TABLE 5.19: CATEGORISATION OF SKILLS WITH WHICH HORTICULTURISTS STRUGGLE, INDICATING % OF TOTAL MENTIONS IN RANK ORDER

Categorisation of skills with which horticulturists struggle	% of total mentions (N: 281)	Rank order
Managerial	16,4	1
Financial	10,7	2
Interpersonal	10,3	3
Communication	9,3	4
Plant utilisation	7,1	5
Labour relations	6,4	6
Landscaping	5,7	7
Computer literacy	5,3	8
Practical application	4,6	9
Problem-solving	4,3	10
Mechanical	3,9	11
Pests and disease control	3,6	12
Commitment	2,5	13
Self-confidence	2,5	13
Irrigation	2,1	15
Marketing	1,4	16
Environmental	1,4	16
Recreation	1,1	18
Soil science	0,7	19
Arboricultural	0,7	19
TOTAL	**100**	**-**

5.9.1 Categories identified

Each of these categories is briefly discussed below (in their rank order):

(i) Managerial (16,4%)

Skills of a managerial nature listed (in no particular order) were the following: project management, safety, office and administrative procedures, supervisory, time management, organisational, delegation, crisis management, stress management, planning, record-keeping, quality assurance and performance management. The above represent 46 mentions by respondents and is by far the category with the highest rank order.

(ii) Financial (10,7%)

A total of 30 mentions were made of a financial nature, most referring to the preparation of budgets, costing schedules, financial or business plans, entrepreneurship and business acumen.

(iii) Interpersonal (10,3%)

The greatest concern expressed by respondents was that horticulturists were unfamiliar with good staff and customer skills. Interpersonal skills were stressed as important on all levels, particularly in dealing with conflict resolution and public and community relations.

(iv) Communication (9,3%)

The majority of focus groups mentioned as critically important general verbal and written skills. Presentation skills, public speaking, speaking an African language, meeting procedures and the ability to explain procedures to staff were also listed.

(v) Plant utilisation (7,1%)

The single most important skill listed was that of plant identification, knowledge of plant characteristics and the optimal usage of plants in real situations. Knowledge of indigenous

plants was particularly stressed as well as the insight skill to be able to picture a plant at maturity.

(vi) Labour relations (6,4%)

Labour relations were discussed at length at many of the focus group interviews and great emphasis was placed on an explicit knowledge of the relevant legislation and its application. Training, unionisation, disciplinary procedures and staff motivation were also listed.

(vii) Landscaping (5,7%)

Skills deficient in horticulturists were those relative to construction, contract documents, site management, hard landscaping, designing, plan literacy and drawing ability.

(viii) Computer literacy (5,3%)

General computer literacy skills were reported to be weak in many horticulturists. No specific computer applications were mentioned.

(ix) Practical application (4,6%)

A number of respondents felt that horticulturists were not prepared to "get their hands dirty" and to "work in the rain". A hands-on or practical approach to the job was seen as important whether this related to working in a team or to the solving of an on-site problem. Any reluctance to be "hands-on" was certainly frowned upon.

(x) Problem-solving (4,3%)

Horticulturists are expected to be practical by nature, with the ability to recognise a problem as it develops. This means being able observe anything out of the norm and being able to apply work-study procedures if required. Corrective action should be taken in time (e.g. plants should be carefully watched for any signs of ill health, the problem identified and solved as soon as practically possible).

(xi) Mechanical (3,9%)

Together with a sound theoretical knowledge, horticulturists are also expected to be able to troubleshoot, to maintain machinery and equipment and to apply safety procedures.

(xii) Pests and disease control (3,6%)

The ability to calibrate spraying equipment was seen as an essential skill, equal in importance to the ability to recognise and identify plant diseases. A thorough knowledge of pesticides, fungicides and herbicides was also important.

(xiii) Commitment (2,5%)

Due to the nature of the work that cannot be categorised into normal working hours, commitment beyond the normal is expected. A willingness to work, enthusiasm, responsibility and commitment are seen as essential. A comment was made that horticulture should be nurtured as a profession and not only as a skill.

(xiv) Self-confidence (2,5%)

Inexperienced horticulturists were often seen as lacking in self-confidence, particularly when dealing with customers and with staff members.

(xv) Irrigation (2,1%)

The ability to design and install a non-complex irrigation system was mentioned as important as was the ability to maintain all systems. Good product knowledge was important to understanding all irrigation systems.

(xvi) Marketing (1,4%)

The comment that "Plants don't sell themselves, people do" emphasizes the point that selling and marketing skills are important.

(xvii) Environmental (1,4%)

Knowledge of not only climatic conditions in South Africa, but also of geographical regions, topography and other environmental factors is regarded as essential to understanding plants, their growth requirements and design parameters.

(xviii) Recreation (1,1%)

The planning and co-ordination of recreation events and the design and layout of recreation facilities was mentioned as important for all those horticulturists working in the Amenity horticulture sector.

(xix) Soil science (0,7%)

A good understanding of soils, their characteristics and composition and their application in growing plants is seen as a core skill for all horticulturists.

(xx) Arboriculture (0,7%)

A serious deficiency relative to arboricultural skills is the inability of many horticulturists to diagnose problems in mature trees and to prescribe the optimal curative treatment.

This paragraph will be concluded with a few brief remarks about the skills indicated as those with which qualifying horticulturists struggle.

5.9.2 Concluding remarks on skills with which horticulturists struggle

A cursory glance at Table 5.19 indicates that the skills with the highest rank order with which horticulturists struggle, are those of a managerial nature. When a further division of these into those of a horticultural, managerial and personal nature is made, the following clustering is apparent:

Managerial	-	59,8%
Horticultural	-	26,3%
Personal	-	13,9%

The above is a clear indication that horticulturists in training should be given every opportunity to improve their managerial skills, during both theoretical and experiential training. While the learning of most of these skills is included in current curricula, it is noteworthy that many are of a general nature and are closely aligned to SAQA's critical outcomes (e.g. Identifying and solving problems, organising and managing, communicating effectively). The presentation to qualifying horticulturists of the above would also assist them in acknowledging which areas of their first jobs they may be deficient in and to which they may have to give special attention. Table 5.19 could be used as a checklist for qualifying horticulturists; i.e. a means of measuring themselves against the standards set by industry.

The following paragraph follows upon the former and is an extension of it. It seeks to answer the question; What background knowledge is desirable for an individual wanting to study for a course in horticulture?

5.10 BACKGROUND KNOWLEDGE

The inclusion of a question that requested participants to identify what they considered to be an appropriate background for entrants into a course of study in horticulture was aimed at identifying the relevant secondary level subjects that would provide this background.

Applicants for registration in the national diplomas in Horticulture at the Cape Technikon are required to have at least a five-subject matriculation certificate, with two official subjects on Higher Grade. No prerequisite subjects are specified. Biology is a recommended subject, as are Physical Science and Mathematics. Respondents were requested to state what they regarded as essential background knowledge (e.g. botany, science, mathematics) for a learner studying to become a horticulturist and being able to apply the core and specific skills listed earlier in the questionnaire. A total of 177 mentions of different subjects were made by the 14 focus groups. These were listed in full, following which a grouping of all responses into the 10 subject areas was made and is presented in Table 5.20. These are indicated in rank order and each is shown with its percentage of the total of 177 mentions.

While Botany (or Biology) has the highest ranking (18,1%) and Mechanical the lowest (4,0%), both these and all other listed subject areas must be considered to be important. What the rank order and percentage allocation do indicate, is the relative importance of each subject area and to what extent each should be included in the school curriculum. This is critical to the selection of suitable applicants for this field of study as well as to learners who need to select their school subjects in preparation for a career in horticulture.

TABLE 5.20: BACKGROUND KNOWLEDGE REQUIRED FOR LEARNERS ENTERING INTO HORTICULTURAL STUDIES

Subject areas	% of total mentions (N : 177)	Rank order
Botany/biology	18,1	1
Physics/chemistry	13,6	2
Ecology/geography	13,0	3
Communication	11,3	4
Management	11,2	5
Business economics	10,2	6
Mathematics	7,3	7
Computer literacy	6,2	8
Art/technical drawing	5,1	9
Mechanical	4,0	10
TOTAL	**100,0**	**-**

The first three subject areas, ranked one to three, relate directly to the scientific aspects of horticulture (total 44,7%), an aspect which should not be discounted in understanding the essence of horticulture. Managerial and communication skills account for a similar percentage (46,2%), which indicates its comparative importance. The creative and mechanical subject areas make up the balance of 9,1%.

While this study is not aimed at developing a pre-tertiary level curriculum, the identification by participants of what they consider to be an appropriate background does serve a useful purpose, firstly in guiding learners in the selection of school subjects and secondly in enabling technikons to select suitable candidates.

The following paragraph is an extension of the former two and asks the question: What criteria should be used by technikons in selecting students for a course in horticulture?

5.11 SELECTION CRITERIA FOR PROSPECTIVE STUDENTS IN HORTICULTURE

Respondents were asked to list the criteria they considered important in the selection of prospective candidates for a course in their particular sectors of horticulture. The objective of this question was to be able to advise technikons as to which criteria were the most important. This was an open-ended question on the questionnaire and drew a wide range of responses. Due to time constraints at the focus group meetings, it was not specifically discussed, though some comments in this regard were interjected during deliberations. Respondents listed a total of 222 criteria. These have been categorised into eleven broader categories in Table 5.21 overleaf.

The specific criteria listed under each of the above categories are discussed below:

(i) Nature/outdoor emphasis (28%)

The greatest concern expressed by respondents was that candidates should have a love of the natural environment, that they should enjoy working outdoors, have a deep-seated interest in the horticulture industry and that they should particularly express their interest in plants. Many stated that this should be a passion for plants, encapsulated in a desire to garden and to green the environment.

TABLE 5.21: CATEGORIES OF CRITERIA IMPORTANT IN THE SELECTION OF CANDIDATES

Categories of selection criteria	% of total mentions (N : 222)	Rank order
Nature/outdoor emphasis	28	1
Motivation	18	2
Interpersonal/communication skills	11	3
Broader interests	11	3
Practical orientation	9	5
Scholastic aptitude	8	6
Creativity	4	7
Physical fitness	3	8
Leadership qualities	3	9
Entrepreneurial	3	9
Other	2	10
TOTAL	**100,0**	**-**

ii) Motivation (18%)

Certainly because of the demanding nature of the profession, respondents stated that candidates should be enthusiastic, energetic and dynamic, able to work long, hard hours, under pressure and with a positive outlook on life and its challenges. They should be keen to learn, have an inquiring mind (be lateral thinkers), have high ethical standards and be committed to lifelong learning.

(iii) Interpersonal/communication skills (11%)

Interpersonal skills were regarded as important with candidates being able to communicate well, to work in a team and to be of a patient disposition.

(iv) Broader interests (11%)

Candidates were expected to express a broad range of interests. These should include knowledge of their immediate environment, hobbies relevant to horticulture (broad), a good general knowledge, an interest in sport and recreation (especially Turf sector) and a working knowledge of computers.

(v) Practical orientation (9%)

The capacity to solve problems, to be prepared to get one's hands dirty, to work outdoors (in all weather conditions) and to have a practical application to the job was also seen as important. This includes the ability to plan and to organise one's resources in order to attain set goals.

(vi) Scholastic aptitude (8%)

A matriculation pass in the Sciences (particularly Biology) was considered as important, though Mathematics, languages and Art were also mentioned.

(vii) Creativity (4%)

An artistic flair and an appreciation of aesthetics were mentioned as important for all sectors. The ability to think three dimensionally, to be imaginative and innovative and to "draw ideas" was seen as important, particularly to the Landscape sector.

(viii) Physical fitness (3%)

While physical fitness may be important to most jobs in all sectors, the Arboricultural sector stated that their candidates should be strong physically, have a good head for heights and have nerves of steel.

(ix) Leadership qualities (3%)

Leadership abilities, self-confidence and the ability to make snap decisions were listed as important in qualified horticulturists.

(x) Entrepreneurial (3%)

Candidates were expected to have knowledge of basic business concepts as an entrepreneurial approach was regarded to be important. Exposure to a retail outlet was seen as useful experience.

(xi) Other (2%)

Other criteria seen as important in selecting candidates were that they should be of an outgoing nature, have a positive attitude, have a neat appearance and "personality". It was recommended that a suitable panel knowledgeable of the industry interview candidates and if necessary a psychometric test should be run.

Consensus amongst focus groups on the most suitable characteristics to be sought in an individual wanting to enter horticulture was that the potential candidate should be someone who was dynamic, hardworking and had a love of the outdoors. While a passion for plants was seen as a characteristic that develops in time, candidates should demonstrate a love of plants and a desire to use them to beautify the environment. Versatility in applying

themselves to varying situations was seen as important because the industry was regarded as being one having many challenges.

In the final question posed to participants, they were asked to make any additional comments. These are discussed in the following paragraph.

5.12 OTHER COMMENTS

Respondents were given the opportunity in an open-ended question at the end of the questionnaire to make any other comments they wished to make. These have been summarised per sector below:

5.12.1 Amenity horticulture

Major changes have occurred in municipal departments of parks and recreation services. One of these has been a split into two departments: one of environmental services, the other of sport and recreation. The horticultural service is becoming rudimentary and a "minimalistic" approach to service provision has been adopted primarily due to political influences and financial constraints. In one local authority, all open space has been graded, and development and maintenance are set at the lowest levels. Outsourcing of many services is also standard practice where the horticulturist has become a "clerk of works" and has greater supervisory responsibilities than horticultural. Horticulturists in the employment of botanical gardens (e.g. National Botanical Institute) do however require good knowledge on horticultural skills. Training of horticulturists should be geared to promoting independent thinking where students can cultivate their own ideas in a new, challenging world.

5.12.2 Arboriculture

Respondents from this sector stated that specialised training was required for horticulturists wanting to enter this sector. As it is so sector-specific and comprises a high-risk component, the training should be developed to meet these specific needs. Extensive hands-on training is important particularly with regard to tree climbing, pruning, felling and tree surgery. It was also stated that many foundational issues in arboriculture have changed in recent years and that students are not aware of these.

5.12.3 Floriculture

The floriculture industry has relied for many years on the expertise of Dutch growers, however many local growers prefer to employ South Africans on their staff because of their knowledge of local climates and environmental conditions, labour forces and the "political situation". The point was made that students should be offered the opportunity to study two or three different crops so that they become aware of the intricacies involved. Experts in the field should expose students to more aspects of the floriculture industry, possibly through site visits or talks.

5.12.4 Landscape

One respondent stated: "The industry is the most important issue here. It must become a strong body, set standards and provide resources for the various sectors. The sectors must work together to promote one another."

5.12.5 Nursery production

Respondents see their responsibility as practitioners in this sector as growers who provide an essential service to the public via the retail nurseries and landscape companies. It is marketing to the latter two that is their prime responsibility, thus the need to develop interpersonal skills. Customer relations should therefore be taught as a subject. Landscapers (particularly Landscape Architects) were often not familiar with plant species and their characteristics and this was seen as a major shortcoming in the industry. Gardening as a hobby should also be promoted more aggressively. Students should be exposed to the sector through real-life projects. Sandwich courses were ideal as they enable selected production nurseries to train students in the specifics of their sector. A need was also expressed to bring "new blood" into the industry.

5.12.6 Nursery retail

Respondents expressed the concern that they are not able to provide training to students in much more than plant identification and in retailing. The concern was expressed that students tend to learn in compartments and never obtain a "big picture". A problem-based approach to student learning was recommended so that students could be exposed to the

intricacies of the retail trade. Nurseries should also be accredited and assessors of student training should be fully qualified. All aspects of co-operative training should be re-evaluated and improved to suit both the student and the trade. A centrally controlled register system was recommended and technikon staff were advised to visit students on a "surprise" basis. This would ensure that the training of students was seen as it really occurs.

5.12.7 Turf

The point was made by a respondent that horticulturists should receive grounding in all sectors of the industry, but should be enabled to specialise in one sector of their choice. The need to improve basic training was also mentioned as a means of raising the standards of training and therefore provisions in the sector.

Not all respondents took the opportunity to complete this part of the questionnaire, though those that did were at pains to restate the aspects of the questionnaire that they considered to be important. It may therefore be concluded that all of the issues raised under this paragraph are worth taking note of. These have been listed under the particular sector and provide a succinct precis of sectoral issues.

5.13 SUMMARY

The 14 focus groups representative of the seven sectors discussed a broad range of issues relevant to the training and employment of horticulturists. The most important values one may expect a horticulturist to demonstrate were identified and clustered into four categories and placed in rank order. The most important value clusters were greening, environmental, professionalism and managerial. Closely aligned to this was the identification of important attributes or qualities that employers desire of a horticulturist. These were clustered into 14 different groups. The most important five of these attributes identified were commitment (includes responsibility, being hardworking, dedication and accuracy), plant management and technical skills, initiative (being a self-starter) and problem-solving (includes a practical application).

Problems and challenges particular to each sector were also identified. Most sectors experience problems and challenges of a technical and/or professional nature. Labour and

managerial problems were listed and participants of all groups listed environmental issues. Client-related problems also occur across all sectors. A broad range of changes have occurred in each sector of the industry over the past 10 years, and most of these are expected to continue into the next five years.

The identification of fields of learning (called overall or core skills/competencies in the focus group questionnaire) for each sector and also the specific skills/competencies for each of the fields of learning were the primary aim of the focus group interviews. The subsequent priority ranking of each field of learning within the seven sectors also served the useful purpose of indicating the weighting of each field of learning, e.g. the Floriculture sector indicated Plant knowledge as the most important field of learning with a percentage allocation of 35% and Communication skills the least important with a percentage allocation of 6%. In comparing all managerial to all horticultural fields of learning across all sectors, a ratio of 40:60 of managerial to horticultural was noted. A total of 25 distinct fields of learning were identified across all sectors and the most important five of these were Managerial (19,8%), Plant knowledge (12,2%), Horticulture (6,9%), Plant protection (6,1%) and Environmental management (5,4%). A comprehensive listing of the identified specific skills per field of learning has been included with Appendix 5.1

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Participants were asked to identify those skills or aspects of the job that recently qualified horticulturists struggle with. These were also to be ranked 1 to 5 in importance. Twenty different categories were extrapolated by the researcher and listed in rank order. The five most important categories were managerial (16,4%), financial (10,7%), interpersonal skills (10,3%), communication (9,3%) and plant utilisation (7,1%). The response to the question on what would be considered to be essential background knowledge (e.g. botany, science, mathematics) revealed that Botany (or Biology), Physics/chemistry, Ecology/geography, Communication and Management were the five most important. A total of 11 categories of selection criteria resulted from the question on what criteria participants considered to be important in the selection of candidates for a course in horticulture. The most important five of these were nature/outdoor emphasis, motivation, interpersonal/communication skills, broader interests and a practical orientation.

The focus group participants made a range of other comments and these were also fully listed. The point was made that participants that utilised the opportunity to complete the space provided for other comments were mostly keen to emphasize a point already made

elsewhere in the questionnaire. These comments were therefore regarded by the researcher to be important and worthy of special note.

This chapter has served to report upon the research results resulting from the focus group interviews. Following the foregoing personal interviews, which served as trial research, this chapter sought to further delve into the curriculum development needs of the horticulture industry. The undertaking of a situational analysis using a qualitative technique like focus group interviews enabled the researcher to study horticultural education and training at Technikons and also to study the training needs of the horticulture industry at this time when curricula are being rewritten in outcomes-based format. The most important aspects studied were the core skills/competencies (called fields of learning) applicable to the seven identified sectors of the industry and the attendant specific skills/competencies of each of the fields of learning. It is particularly the latter that will be used in developing a mail questionnaire survey, which will be distributed to members of the industry's professional bodies throughout the country. The results of the mail survey will be reported upon in the following chapter.

CHAPTER SIX

ANALYSIS OF DATA OBTAINED FROM THE MAIL SURVEY

6.1 INTRODUCTION

As mentioned in Chapter 3, the decision to complement the foregoing qualitative methodologies with a mail survey was based on the premise that a quantitative methodology would increase the generalisability of the study. This triangulation approach would also serve to increase the overall validity of the research.

The self-administered mail questionnaire was divided into Sections A and B. The former related mostly to questions of a biographical and a general nature and the latter to questions relative to the skills/competencies (i.e. fields of learning) identified during the focus group interviews. The seven general and biographical questions were directed at determining the respondent's sector, his/her employment in the sector and in the industry as well as his/her personal qualifications and experience. Topics or areas of in-service training provided by companies/institutions represented by respondents were also identified as well as the respondents' ratio of horticultural responsibilities as opposed to managerial/administrative. Respondents were also asked to identify an appropriate name for a horticulturist working in their particular sector.

The second part of the questionnaire asked respondents five questions relative to curriculum development and the identification of skills/competencies. In the first question respondents were provided with an adapted list of the fields of learning for each sector, as identified earlier by the focus group participants. Respondents were requested to rate the different fields of learning for each sector in terms of exposure (time) they considered should be spent on each field of learning. The same question asked respondents to evaluate on a 5 point-Likert scale the level of preparedness of graduates. Respondents were also asked to identify for each sector they were competent in, a range of specific skills for each field of learning.

The focus group participants had also identified a list of attributes which employers could expect to find in a horticulturist coming in to their employment and respondents to the mail survey were asked to rate on a 5-point Likert scale the degree of importance of each as well as the level of achievement of each. The latter related to how well horticulturists were seen to be achieving the attributes. In order to identify the degree of generality between

sectors, respondents were asked to consider the exposure (time) a student studying for a career in their sector should be exposed to all other sectors. Respondents were asked to indicate from their experience, what the relationship in work responsibilities would be for a qualifying horticulturist, between managerial and horticultural responsibilities after two, five and 10 years of experience. Respondents were also asked to make any concluding comments and/or suggestions.

The paragraphs below focus in detail on the mail questionnaire used (see either Table 3.4 for a list of the questions or Appendix 3.7 for the full questionnaire). Each of the questions will be described and evaluated and thereafter the results will be discussed.

6.2 PREAMBLE, DIRECTIONS TO COMPLETE AND CONTACT DETAILS

The first four pages of the questionnaire included the introductory letter, directions for returning the questionnaire and the respondent's contact details. Respondents were also given the opportunity to indicate whether they would be prepared to be included in any further investigations into either the training of horticulturists and/or horticultural staff. A total of 126 respondents answered this question, of which 85 indicated that they would like to be involved in the training of horticulturists and 66 said that they would like to be involved in the training of horticultural staff. The names and addresses of these respondents will be kept for future reference and/or further investigations.

6.3 GENERAL AND BIOGRAPHICAL QUESTIONS

A number of questions of a general and biographical nature were posed to the respondents (see Table 3.4). These related to the sector in which they were employed, the in-service training provided to horticulturists by their company/institution, their own qualifications and experience within each sector and the division of responsibilities in their current position. Lastly, respondents were asked to suggest an appropriate name for a horticulturist working in their sector.

The motivation for asking each of these questions as well as the outcome of each in terms of the response generated will be discussed below in the sequence in which they were asked.

6.3.1 Identification of sectors per company/institution

The importance of this question (see Question 1, Table 3.4) relates to the identification of the sectors represented by the respondents. Each respondent was asked to indicate in which of the listed sectors his/her company/institution operate, as well as the number of horticulturists employed in each of the sectors. This question was useful as it provided an indication of the size of the population. It was mentioned in Paragraph 3.4.3.3.3 that a register of horticulturists working in South Africa does not exist and while the response to this question does not provide a list of horticulturists per sector, it does provide an indication of the representativity of the sample. A degree of duplication may exist where, for example, respondents working for the same company/institution repeated the sectors represented by their company/institution and/or listed again the number of horticulturists within each sector. The data listed in Table 6.1 and 6.2 should be read with some circumspection.

TABLE 6.1: NUMBER OF SECTORS REPRESENTED BY RESPONDENTS

Sectors	Rank order	N	%
Landscape	1	55	19,2
Nursery production	2	51	17,8
Amenity horticulture	3	47	16,4
Nursery retail	4	43	15,0
Turf	5	35	12,2
Arboriculture	6	30	10,5
Floriculture	7	25	8,7
TOTAL	**-**	**286**	**100**

Table 6.1 lists the seven sectors in rank order according to the number of times respondents indicated the sectors in which their companies/institutions operate. Most companies/institutions were involved in the Landscape (19,2%), Nursery production (17,8%), Amenity horticulture (16,4%) and Turf (15,0%) sectors and the least involved in were the Nursery retail (12,2%), Arboriculture (10,5%) and Floriculture (8,7%) sectors. Where the number of responses was 286 and the number of respondents 171, a total of 115 sectors were listed as additional. Some of these were of two or three additional sectors, but clearly most respondents considered their companies/institutions to be involved in one sector only.

TABLE 6.2: NUMBER OF HORTICULTURISTS IN EACH SECTOR			
Sectors	**Rank order**	**N**	**%**
Nursery production	1	213	22,8
Landscape	2	199	21,2
Amenity horticulture	3	193	20,6
Nursery retail	4	127	13,6
Turf	5	71	7,6
Arboriculture	6	53	5,7
Floriculture	7	49	5,2
Other	8	31	3,3
TOTAL	-	**936**	**100**

Table 6.2 indicates that most horticulturists (as represented by the respondents) are employed in the Nursery production (22,8%), Landscape (21,2%), Amenity horticulture (20,6%) and Nursery retail (13,6%) sectors while the least are employed in the Turf (7,6%), Arboriculture (5,7%) and Floriculture (5,2%) sectors. The latter four sectors are the four sectors in which many non-horticulturally qualified persons find employment. The Arboriculture and Floriculture sectors are also considered to be the smallest of the seven listed sectors. Including the 31 horticulturists employed in the "other" sector (i.e. allied trade, educational institutions), a total of 936 horticulturists are represented by this survey. Should one assume this to be the survey population, the response of 171 questionnaires is a response rate of 18,3% which is not dissimilar from that of 23%, referred to under Paragraph 3.4.3.3.4 above.

6.3.2 Sectors in which respondents were primarily employed

Respondents were again provided with a list of the seven sectors (listed alphabetically) and asked to indicate the sector in which they were primarily employed. Respondents were asked to select only one sector as this would be an indication of the representivity of the sample, i.e. by "sector of primary employment" or put differently, to what extent the seven sectors are equally represented. It should be noted that the non-response to this question was 12,9%, primarily as a result of the non-employed and retired respondents regarding the question as not applying to them.

As can be seen in Table 6.3 below, the Landscape (22,8%), Amenity horticulture (20,1%) and Nursery production (16,8%) sectors represented most respondents. The lower

response rate from the Turf (12,1%), Nursery retail (8,1%), Floriculture (7,4%), Arboriculture (6,7%) and other (6,0%) sectors was partly due to the smaller size of those sectors. Respondents of the nursery retail sector did state that the timing of the survey overlapped with their busy season and this may affect the response rate. Most of the respondents who indicated "other" were employed in the education and training sector.

TABLE 6.3: SECTORS IN WHICH RESPONDENTS WERE PRIMARILY EMPLOYED

Sectors	Rank order	N	%
Landscape	1	34	22,8
Amenity horticulture	2	30	20,1
Nursery production	3	25	16,8
Turf	4	18	12,1
Nursery retail	5	12	8,1
Floriculture	6	11	7,4
Arboriculture	7	10	6,7
Other	8	9	6,0
TOTAL	**-**	**149**	**100**

6.3.3 In-service training provision by companies/institutions

Respondents were asked to indicate whether their company/institution provides in-service training programmes to horticulturists. These were not to relate to the day-to-day training of staff by supervisors or the training of students, but to specially arranged training programmes (e.g. computer courses). The 71 respondents (46,4%) who indicated in the affirmative were then asked to list the topics or the areas of training to which horticulturists are exposed. This question was aimed at identifying to what extent in-service training was being instituted for horticulturists in the industry, i.e. what was the ratio of companies/institutions who provide training as to those who do not provide training. This together with the topics or areas in which training was being provided would be useful to both educational providers and the broader industry.

The topics or areas of in-service training programmes provided by companies/institutions most mentioned by respondents are listed in rank order in Table 6.4. The 71 respondents listed a total number of 456 responses or mentions and the ratio of each topic or area of training to the total is also listed as a percentage.

TABLE 6.4: TOPICS OR AREAS OF IN-SERVICE TRAINING PROGRAMMES PROVIDED BY COMPANIES/INSTITUTIONS			
Topics or areas of training	**Rank order**	**N**	**%**
Communication	1	51	11,2
Labour and related aspects	1	51	11,2
Machinery/equipment	3	48	10,5
Interpersonal skills	4	47	10,3
Managerial	5	45	9,9
Horticultural	6	42	9,2
Computer skills	7	36	7,9
Legislation	7	36	7,9
Pest, weed and disease control	7	36	7,9
Marketing/public relations	10	30	6,6
Entrepreneurial/business	11	29	6,4
Other	12	5	1,1
TOTAL	**-**	**456**	**100**

The two most important topics or areas of training (receiving most mentions) were communication (11,2%) and labour and related aspects (11,2%), followed by machinery/equipment (10,5%), interpersonal skills (10,3%) and managerial skills (9,9%). The topics or areas of training listed under "other" relate to irrigation installation and maintenance.

When a differentiation only is made between training programmes of a managerial or horticultural nature, the greatest need for training appears to be managerial (71,3% as opposed to 28,7% for horticultural).

6.3.4 Qualifications of respondents

Respondents were asked to list the qualifications, including short courses, that they had obtained under each of the sectors. Those respondents with one or more qualifications listed a total of 176 qualifications. These have been listed according to sectors in Table 6.5, cross-tabulated with the level of qualifications as either certificate, diploma and degree and post-graduate. The ratio between the different levels of qualifications was certificate at the lowest level (25,6%), diploma on third year level (54,5%) and degree and post-

graduate (19,9%). The number of qualifications within the seven sectors is listed in Table 6.5.

TABLE 6.5: LEVELS OF QUALIFICATIONS OF RESPONDENTS WITHIN SECTORS						
Sectors	**Qualification levels**					
	Certificate	**Diploma**	**Degree and Post-graduate**	**Total**	**%**	**Rank order**
Amenity horticulture	6	40	8	54	30,7	1
Landscape	7	15	10	32	18,2	2
Other	8	5	14	27	15,3	3
Turf	15	3	1	19	10,8	4
Nursery retail	3	13	0	16	9,1	5
Nursery production	1	11	1	13	7,4	6
Arboriculture	3	4	1	8	4,5	7
Floriculture	2	5	0	7	4,0	8
TOTAL	**45**	**96**	**35**	**176**	**100**	**-**
%	**25,6**	**54,5**	**19,9**	**100**	**-**	**-**

The highest number of qualifications was found to be within the Amenity horticulture (30,7%) and Landscape (18,2%) sectors. Both of these sectors also have 18 of the 35 graduate and post-graduate qualifications and 55 of the 96 diploma level qualifications, making these sectors the most highly qualified amongst survey respondents. The Turf sector has a large number of certificate-level respondents and is a sector that is well serviced by short-courses run by technikons. The 27 qualifications, which were not directly related to one of the seven sectors, have been listed under "other". The majority (13) were managerial and the balance ranged from Agriculture, to Education, Environmental Management and Civil Engineering.

Respondents were also asked under this question to indicate the year in which they were qualified. This enabled the researcher to determine the average number of years of experience for all respondents within each sector. This is listed in Table 6.6 below, which indicates that respondents with arboricultural qualifications have the most experience on average (32,9 years) since receiving their qualifications. Those in the Floriculture sector (30,2 years) and Nursery production (24,1 years) also have a high average numbers of years experience. All other sectors including "other" (educational and allied) range between 12,1 years and 5,7 years. The last-mentioned sector, Amenity horticulture, has

the lowest average number of years experience since receiving their qualifications. The average for all respondents is 16,5 years, which does indicate a broad level of experience across all sectors.

TABLE 6.6: AVERAGE NUMBER OF YEARS SINCE QUALIFIED		
Sector	**Rank order**	**Average no. years of experience**
Arboriculture	1	32,9
Floriculture	2	30,2
Nursery production	3	24,1
Nursery retail	4	12,1
Other	5	10,5
Landscape	6	8,1
Turf	6	8,1
Amenity horticulture	8	5,7
AVERAGE NUMBER OF YEARS SINCE QUALIFIED		**16,5**

Should one assume that the representativity of the sample is fairly accurate, members of those sectors where qualifications are not yet as highly regarded, should take note of the other sectors where the level of qualifications held by its practitioners is high.

6.3.5 Years of experience of respondents

Respondents were asked to list the number of years of experience they had in each of the sectors. This was to be completed irrespective of whether they had been working in more than one sector at a time. This question was aimed at in determining the level of experience respondents had within each sector. An 8% non-response to this question was recorded and most respondents indicated that they had experience in at least two or more sectors. Respondents best represented the following sectors in terms of at least some exposure: Landscape, Amenity horticulture, Nursery production and Nursery retail. Floriculture, Turf and Arboriculture were least well represented.

Table 6.7 indicates that the average number of years of experience across the seven sectors (including other) was 12,6 years. This correlates fairly closely with the 16,5 years of experience (for all respondents since receiving their qualifications) listed in Paragraph 6.3.4 above. The spread of experience within sectors is fairly uniform with the highest

being Turf (15,2 years) and the lowest being Nursery retail (7,2 years). This indicates that on average respondents had more than adequate experience to be able to make a positive contribution to the survey. Those who indicated "other" had indicated that they were either employed in the education sector or in the allied trade sector.

TABLE 6.7: AVERAGE NUMBER OF YEARS OF EXPERIENCE WITHIN SECTORS		
Sector	**Rank order**	**Average number of years of experience**
Turf	1	15,2
Amenity horticulture	2	15,1
Landscape	3	13,9
Arboriculture	4	13,8
Other	5	13,3
Floriculture	6	11,5
Nursery production	7	10,4
Nursery retail	8	7,2
AVERAGE NUMBER OF YEARS OF EXPERIENCE		**12,6**

6.3.6 Location of experience of respondents

Respondents were asked in the same question as above to indicate where they had been employed during their years of experience. Responses to this were classified into private, state, overseas and other, the prime reason being to determine to what extent there was an even distribution of experience gained between the state and the private sectors.

A total of 158 respondents provided a total of 459 responses. Table 6.8 indicates that most respondents (54,5%) had gained their experience in the state employment sector, while 43,1% had gained their experience in the private employment sector and 2,4% had gained their experience at an overseas institution. In the latter, no differentiation was made between state and private. A study of the percentages under private, state and overseas employment sectors, across the different sectors, indicates that respondents in the Amenity horticulture (84,7%), Arboriculture (69,6%), Floriculture (59,4%) and Turf (65,2%) sectors of the industry mostly represent the state sector. The private sector was most represented in the Nursery production (74,6%), Landscape (61,8%) and the Nursery retail (58,5%) sectors. Those who listed their sector as "other" represented the educational and allied trade sub-sectors.

TABLE 6.8: LOCATION OF EXPERIENCE OF RESPONDENTS				
Sector	**N:459**	**Location %**		
		Private	**State**	**Overseas**
Amenity horticulture	72	15,3	84,7	0
Arboriculture	46	26,1	69,6	4,3
Floriculture	32	34,4	59,4	6,2
Landscape	89	61,8	38,2	0
Nursery production	82	74,6	23,9	1,5
Nursery retail	67	58,5	39,0	2,5
Turf	48	43,7	56,3	0
Other	23	30,4	65,2	4,4
AVERAGE %		**43,1**	**54,5**	**2,4**

6.3.7 Division of responsibilities of respondents

Respondents were asked in this question to indicate the broad division of responsibilities in their current position in terms of those that are horticultural, managerial/administrative and all other. The objective of this question was to ensure that there was an equitable relationship between respondents whose responsibilities were primarily horticultural and those whose responsibilities were primarily managerial/administrative. The researcher was conscious of the fact that an over-emphasis on either of these areas of responsibility may have indicated that respondents were all too senior (in managerial/administrative positions) or too junior (in horticultural positions). This concern had relevance to the validity of the survey questionnaire.

The ratio of horticultural responsibilities to managerial/administrative to "other" was 39,8%: 56,0%:4,9%. This ratio is considered equitable and should heighten the validity of the findings because of the high percentage of respondents with responsibilities of either or both a horticultural and a managerial/administrative nature. Most of the other responsibilities related to educational and training responsibilities.

6.3.8 Appropriate name for a horticulturist

A great deal of confusion appears to exist in the horticultural industry as to the most appropriate name for a horticulturist working in any of the particular sectors. It is the

researcher's experience that a range of names is used for persons working in the different sectors and that this is in particular a problem to qualifying students who want an incumbent name for their sector. In order to suggest an appropriate name for horticulturists who have specialised in any specific sector, respondents were asked to recommend a suitable name for a horticulturist working in their particular sector. The names currently used range for example in the Landscape sector from landscaper to landscape technologist and in the Turf sector from greenkeeper to groundsman. While a uniform name across the seven sectors may be thought to be that of "horticulturist", the name is not used in all sectors.

The names suggested in English and Afrikaans for each of the sectors are listed in the paragraphs below (the frequency of response of each is given in brackets):

6.3.8.1 Amenity horticulture

Horticulturist (21)
Manager/Manager Horticulturist/District Manager/Open Space Manager (6)
Amenity Horticulturist (3)
Plant Technician (2)
Plantsman (1)
Horticulturist Technologist (1)
Community Development Worker Horticulturist (1)
"Streekstuinboukundige" (Regional Horticulturist) (1)

The 36 responses appear to represent the range of positions horticulturists hold within the sector. The title "horticulturist" is clearly preferred even though it might not be specific to this sector. "Amenity horticulturist" may be a suitable alternative. The name "parks and recreation manager" was not listed at all, this being the name of the diploma dedicated to practitioners in this sector (i.e. ND: Parks and Recreation Management, now called Open Space and Recreation Management). Clearly these titles are not preferred. The only Afrikaans name given was that of "streekstuinboukundige" (regional horticulturist).

6.3.8.2 Arboriculture

Arborist (6)

Arboriculturist (1)
Horticulturist (1)
Plant Technician (1)

The two most common names for a horticulturist in this field are that of arborist and arboriculturist. The former seems to be preferred.

6.3.8.3 Floriculture

"Blomsaadmaker" (Flower Seed Producer) (3)
Grower (1)
Rose Grower (1)
"Blomkweker" (Flower grower) (1)
Horticulturist (1)

A name commonly given to a horticulturist in both the Floriculture and Nursery production sectors is simply that of "grower". Perhaps "flower grower" would be the most suitable. The term "blomsaadmaker" (flower seed producer) refers to a specialised job in Floriculture.

6.3.8.4 Landscape

Landscape Horticulturist (4)
Landscape Technologist (3)
Horticulturist (2)
Landscaper (2)
Landscape Designer (2)
Designer (1)
Private Landscaper (1)
Contracts Manager (1)
Land Planning Advisor (1)
Service Manager (1)
Landscape Architect (1)
Horticulturist in Turf and Landscape (1)

The 20 responses led to 12 different names, an indication of the disparity in the industry as to which name is best suited to a practitioner in this sector. One may assume that the ND in Landscape Technology prepares one for a career as Landscape Technologist, yet only three respondents indicated it as the name of their choice. The name "landscape horticulturist" is probably a wise choice as it clearly identifies a horticulturist who works in the landscape sector.

6.3.8.5 Nursery production

Horticulturist (10)
Propagation/Propagationist/Plant propagationist/Propagation horticulturist (5)
Grower (3)
Horticultural Technologist (1)
Plant Specialist (1)
Production Assistant (1)
Managerial Productionist (1)
"Kwekeryvoorsieningskweker" (Nursery Supply Grower) (1)

Amongst the total of 19 responses received, the most popular name was the generic name of "horticulturist", followed by a name which includes "propagation" and similar to this, "grower". In the industry itself, the last mentioned may be how horticulturists refer to someone who produces plants for re-sale, but a more formal title may be "propagation horticulturist".

6.3.8.6 Nursery retail

Nursery Manager (1)
Retail Horticultural Manager (1)
Manager (1)

Only three responses were given for this sector, all of them referring to his/her managerial status. This may only apply once a horticulturist has been appointed to a position of seniority. The name "horticulturist" or "retail horticulturist" may be best suited, as it would include those entering this sector.

6.3.8.7 Turf

Agronomist (2)
Turf Maintenance Manager (1)
Golf Course Manager (1)
Turfgrass Manager (1)
Manager (1)
Greenkeeper (1)
Sportsground Superintendent (1)
Horse-racing Groundsman (1)
Sportsfield Horticulturist (1)
Horticulturist in Turf and Landscape (1)

The 11 responses seem to represent 10 different job positions. The term "manager" was mentioned in four different names, clearly because the post incumbent is responsible for grounds and has a range of resources (e.g. machinery, labour, materials) at his/her disposal.

The name "groundsman" or "greenkeeper" denotes a person of similar position, but possibly not yet manager. Both of the latter two names are used extensively in this sector in the UK and USA. In South Africa, where a horticulturist is appointed to a position of this nature, he/she would be responsible for a range of facilities and would likely be at least the assistant manager. Many post incumbents do not have a diploma in horticulture (refer Paragraph 6.3.4) and a differentiation in title where a horticulturist is employed may be appropriate. A suitable name may then be "agronomist" (denotes scientific study) or a "turfgrass horticulturist".

As mentioned above, the ability to identify a horticulturist's sectoral specialisation is a need expressed by qualifying graduates. The identity generated by a name has particular advantages to the industry in general and also to the post incumbents. The curriculum developer should take note of those names preferred by members of the professional bodies that represent specific sectors.

6.4 QUESTIONS RELATIVE TO THE IDENTIFICATION OF SKILLS/COMPETENCIES

Five questions that relate to curriculum development and in particular to the identification of skills/competencies were posed to respondents in Section B of the questionnaire. In the first two questions respondents were asked to weight the different fields of learning within the seven sectors, to evaluate the preparedness of students for the specific sectors and also to identify the specific skills/competencies which respondents may regard as important within each field of learning.

In the following question, respondents were asked to rate the importance of and also how well horticulturists are seen as achieving 14 listed attributes or characteristic qualities which employers desire of a horticulturist entering into their employment.

The following question asked respondents for their opinion relative to the composition of a course of study, which may have included elements of each of the seven sectors. The final question asked respondents for their opinion on the ratio of a horticulturist's horticultural vs managerial responsibilities after two, five and 10 years of being qualified. Sufficient space was provided at the end of the questionnaire for any further suggestions and/or comments.

The motivation for asking each of the questions in this section of the questionnaire as well as the outcome in terms of the respondent response, will be discussed below in the sequence used in the questionnaire.

6.4.1 Sectoral response to identified fields of learning

As reported under Paragraph 5.7, the focus groups for each sector identified specific fields of learning (i.e. a group of core skills or competencies) which were representative of the work performed by a graduate (i.e. a recently qualified horticulturist) working in that sector. Respondents to the mail survey were provided with a list of these identified fields of learning for each of the seven sectors. It should be noted that as the mail survey made use of self-administered questionnaires and respondents were not able to question the interpretation of the fields of learning, the researcher was obliged to combine some of these into a field of learning which was not ambiguous or unclear. The following adaptations were made:

- Amenity horticulture:
  - Plant knowledge included in Horticulture
- Floriculture:
  - Soil science included in Plant knowledge
- Landscape:
  - Human resources management included in Management
  - Maintenance included in Horticulture
- Nursery retail:
  - Marketing included in Retailing
  - Plant management included in Plant knowledge
- Turf:
  - Primary cultural practices and Secondary cultural practices included in Agronomy/ cultural practices

This has unfortunately meant that the response to this question is not directly comparable to that made by the focus group interviewees. The greater accuracy gained in the mail survey by applying the above changes was considered to be more important. Comparisons do indicate that a high degree of comparability was obtained in the response of the focus groups to that of the mail survey. Generalisability too of the latter was considered to be the greater goal.

Respondents were asked to select the sector(s) to which they had been exposed and to allocate a weighting in percentages to each of the fields of learning. This was to be done so that a proportionate allocation of time in each field of learning was identified that a student studying for a career in that sector should spend on each field of learning. Respondents were secondly asked to specify on a Likert-type scale from 1 to 5 (where 1 was not prepared and 5 was very well prepared) how in their opinion graduates had readied or prepared themselves for each field of learning.

In the analysis of the first part of this question (see Question 8a, Table 3.4), the allocation by respondents of a percentage to each field of learning was tallied and the ratio of each field of learning (for each of the seven sectors) has been expressed as a percentage. In the second part of this question (8b), respondents were asked to evaluate student preparedness on a scale from 1 to 5. The responses for each category on the scale and for each field of learning were tallied and a percentage response was obtained for each

scale category and for each field of learning. The survey results of each of the seven sectors will be discussed in the paragraphs below. The results of each sector's response are indicated in Tables 6.9 to 6.22, where the fields of learning have been placed in rank order of importance.

Prior to the presentation of the above results, the statistical significance for all sectors of the variables "preparedness of graduates" and "fields of learning" will be evaluated.

6.4.1.1 Statistical significance of variables

Different interpretations were placed upon the various fields of learning by respondents (in the seven sectors) in the focus group interviews and subsequently in the mail questionnaire also. Fields of learning across sectors cannot therefore be directly compared, despite identical terminology (e.g. Management as applied to Arboriculture is not identical to Management in Landscape). A direct comparison between the fields of learning of the different sectors would only have been possible if each field of learning had been clearly defined prior to the focus group interviews and the mail survey. The researcher was advised (interview with Prof. D.G. Nel of the Centre for Statistical Consultation of the University of Stellenbosch, 13 June 2002) to determine the statistical significance in each sector of the variable "fields of learning" as opposed to the variable "preparedness of graduates". These were tested using Chi-square tests.

The number of respondents who indicated a response to the field of learning "other" was in all sectors fewer than 15, which is far fewer than the other fields of learning. The Chi-square test was accordingly applied to the set of variables for each sector with and also without the field of learning "other".

The results of the tests are firstly indicated when "other" is included. In this case the test indicated that for all sectors except Turf, there were significant differences regarding preparedness of graduates and the fields of learning. Where the probability test was applied excluding “others”, it indicated that for all sectors except Arboriculture, there were significant differences between the preparedness of graduates and the fields of learning. The tests indicated therefore that there were not significant differences regarding the preparedness of graduates among the Turf fields of learning and there were not significant differences in the Arboriculture fields of learning, in leaving out “others”.

The undertaking of this test has enabled the researcher to present the results of this question (Question 8, Table 3.4) with confidence, though some circumspection should be used in the Turf and Arboriculture sectors, as indicated.

6.4.1.2 Preparedness of graduates for fields of learning in different sectors

The results of the response to this question are presented in tabular form in the following paragraphs and include a brief discussion.

6.4.1.2.1 Amenity horticulture

Table 6.9 indicates that within the Amenity horticulture sector there are three central fields of learning, which make up 72,8% of the response. These were in favour of (in rank order) Horticulture (28,7%), Management (24,1%) and Landscape (20,0%).

TABLE 6.9: AMENITY HORTICULTURE FIELDS OF LEARNING IN ORDER OF IMPORTANCE IN CURRICULUM (TIME)

Fields of learning	Importance of Fields of learning	
	Rank order	%
Horticulture	1	28,7
Management	2	24,1
Landscape	3	20,0
Environmental management	4	13,0
Community recreation	5	11,4
Other	6	2,8
TOTAL	-	**100,0**

As respondents were requested to allocate the time a student studying for a career in this sector should spend on each field of learning, 72,8% of the time allocation (or the credit rating) should be made up of the modules which make up these three fields of learning. Environmental management (13,0%) and Community recreation (11,4%) are less important, but in combination are still considered important enough to make up 24,4% of the curriculum for a diploma programme in Amenity horticulture.

Fifteen skills/competencies were mentioned under "other" and are listed below. (While some could be included under the five fields of learning, they have been listed independently because respondents may have considered them important enough for special mention.)

Irrigation (2)
Costing
Computer training
Labour relations (2)
Arboriculture
Sports turf
Landscape maintenance (2)
Chemical control of pests and diseases
Fertilizers
Marketing
Equipment
Interior landscaping

TABLE 6.10: AMENITY HORTICULTURE FIELDS OF LEARNING INDICATING PREPAREDNESS OF GRADUATES

Fields of learning	Preparedness of graduates					
	N	Average (%)				
		Not prepared	Poorly prepared	Adequately prepared	Well prepared	Very well prepared
Horticulture	77	2,6	7,8	45,5	37,7	6,4
Management	75	14,7	46,7	25,3	12,0	1,3
Landscape	77	2,6	16,9	55,8	22,1	2,6
Environmental management	72	12,5	37,5	38,9	11,1	0
Community recreation	68	19,1	30,9	35,3	11,8	2,9
Other	15	46,7	40,0	13,3	0	0

Table 6.10 lists the same fields of learning (in the same rank order as Table 6.9), but also indicates the degree of preparedness with which respondents saw graduates having readied or prepared themselves for each field of learning. The results of the tests indicated that there were significant differences regarding the preparedness of graduates among the Amenity horticulture fields of learning, furthermore that when "others" were left

out of the test, there were also significant differences regarding the preparedness of graduates in the fields of learning.

The following fields of learning were identified as being those where students are less than adequately prepared (i.e. not prepared and poorly prepared): Management (61,4%), Environmental management (50,0%), Community recreation (50,0%) and other (86,7%). Respondents were most satisfied (i.e. well prepared and very well prepared) with Horticulture (44,1%) and Landscape (24,7%). While the latter are central to this sector, the other three fields of learning should be given special attention in curriculation revision as well as in teaching and learning. Those skills/competencies listed under "other" should also receive special attention.

6.4.1.2.2 Arboriculture

Arboricultural skills (28,9%) and Management (22,8%) were considered to be the two most important fields of learning in the Arboriculture sector, making up 51,7% of the programme (see Table 6.11). The balance is made up of Environmental management (15,6%), Education/training (15,3%), Arboriculture and the law (15,3%) and other (2,1%). The skills/competencies listed under "other" were:

Irrigation
Costing
Computer skills
Tree surgery
Equipment

As mentioned in Paragraph 6.4.1.1 above, the results of the tests indicated that there were significant differences regarding the preparedness of graduates in the Arboriculture fields of learning, however that when "others" were left out of the test, there were not significant differences regarding the preparedness of graduates in the fields of learning.

Table 6.12 indicates that respondents considered graduates to be generally poorly prepared (i.e. less than poorly prepared) in Management (65,1%), Arboriculture and the law (62,5%), Education/training (53,8%), Environmental management (50,0%), Arboricultural skills (48,7%) and in the skills/competencies listed under "other" (83,3%).

TABLE 6.11: ARBORICULTURE FIELDS OF LEARNING IN ORDER OF IMPORTANCE IN CURRICULUM (TIME)		
Fields of learning	**Importance of Fields of learning**	
	Rank order	**%**
Arboricultural skills	1	28,9
Management	2	22,8
Environmental management	3	15,6
Education/training	4	15,3
Arboriculture and the law	5	15,3
Other	6	2,1
TOTAL	_	**100,0**

The only fields of learning where respondents indicated a measure of satisfaction was in that of Education/training where 18,0% recorded that graduates were more than well prepared. Respondents appear however to be generally dissatisfied with all fields of learning and serious attention needs to be given to curriculum revision as well as to teaching and learning.

TABLE 6.12: ARBORICULTURE FIELDS OF LEARNING INDICATING PREPAREDNESS OF GRADUATES						
Fields of learning	**Preparedness of graduates**					
	N	**Average (%)**				
		Not prepared	**Poorly prepared**	**Adequately prepared**	**Well prepared**	**Very well prepared**
Arboricultural skills	39	17,9	30,8	41,0	7,7	2,6
Management	43	18,6	46,5	23,3	9,3	2,3
Environmental management	42	14,3	35,7	42,8	4,8	2,4
Education/training	39	12,8	41,0	28,2	15,4	2,6
Arboriculture and the law	40	27,5	35,0	30,0	7,5	0
Other	12	66,6	16,7	0	0	16,7

6.4.1.2.3 Floriculture

Respondents accorded technical fields of learning within the Floricultural sector 63,6% of the curriculum time (see Table 6.13). Opposed to this, managerial fields of learning warrant 36,3% of the curriculum time. The most important technical fields of learning are

knowledge about plants (23,9%) and knowledge about the pests, weeds and diseases that limit their growth and development (19,1%).

TABLE 6.13: FLORICULTURE FIELDS OF LEARNING IN ORDER OF IMPORTANCE IN CURRICULUM (TIME)

Fields of learning	Importance of Fields of learning	
	Rank order	%
Plant knowledge	1	23,9
Pest, weed and disease management	2	19,1
Management	3	14,3
Communication	4	11,7
Harvesting and post-harvesting	5	11,3
Economics and marketing	6	10,3
Technical/equipment/structures	7	9,3
Other	8	0,1
TOTAL	_	**100,0**

The skills/competencies listed under "other" were:

Environmental management
Labour relations
Equipment
Irrigation

The results of the tests indicated that there were significant differences regarding the preparedness of graduates among the Floriculture fields of learning, furthermore that when "others" were left out of the test, there were also significant differences regarding the preparedness of graduates in the fields of learning. Table 6.14 indicates that respondents considered graduates to be least well prepared (i.e. less than poorly prepared) for the following fields of learning: Economics and marketing (61,8%), Management (59,5%), Communication (25,0%), Technical/equipment/structures (39,4%) and Harvesting and post-harvesting (33,4%). Graduates were found to be the best prepared (i.e. more than well prepared) for Plant knowledge (40,0%) and for Pest, weed and disease management (31,7%).

TABLE 6.14: FLORICULTURE FIELDS OF LEARNING INDICATING PREPAREDNESS OF GRADUATES						
Fields of learning	**Preparedness of graduates**					
	N	**Average (%)**				
		Not prepared	**Poorly prepared**	**Adequat-ely prepared**	**Well prepared**	**Very well prepared**
Plant knowledge	40	2,5	7,5	50,0	30,0	10,0
Pest, weed and disease management	41	2,4	17,1	48,8	24,4	7,3
Management	37	24,3	35,2	21,6	18,9	0
Communication	36	25,0	27,8	38,9	8,3	0
Harvesting and post-harvesting	36	16,7	16,7	58,2	5,6	2,8
Economics and marketing	34	23,5	38,3	32,4	2,9	2,9
Technical/equipment/structures	33	6,1	33,3	42,4	18,2	0
Other	5	66,7	0	33,3	0	0

6.4.1.2.4 Landscape

The complementary fields of learning of Landscape construction (17,5%) and Landscape design (17,4%) make up 34,9% of the Landscape sector's curriculum time (see Table 6.15).

TABLE 6.15: LANDSCAPE FIELDS OF LEARNING IN ORDER OF IMPORTANCE IN CURRICULUM (TIME)		
Fields of learning	**Importance of Fields of learning**	
	Rank order	**%**
Horticulture	1	20,2
Landscape construction	2	17,5
Landscape design	3	17,4
Management	4	13,2
Communication	5	10,9
Irrigation	6	10,9
Equipment (logistics)	7	8,8
Other	8	1,1
TOTAL	_	**100,0**

When the other technical fields of learning specific to Landscape, i.e. Irrigation (10,9%) and Equipment (logistics) (8,8%) are added, 54,6% of the curriculum would be devoted to fields of learning specific to this sector. The most important single field of learning includes all horticultural skills/competencies (20,2%). The balance of the curriculum comprises Management (13,2%) and Communication (10,9%), which is a total of 24,1%. Skills/ competencies listed under "other" included:

Sports turf and drainage (3)
Landscape maintenance (2)
Environmental management
Quality measurement
Labour relations

The results of the tests indicated here again that there were significant differences regarding the preparedness of graduates among the Landscape fields of learning, furthermore that when "others" were left out of the test, there were also significant differences regarding the preparedness of graduates in the fields of learning. Table 6.16 indicates that the fields of learning where graduates were least well prepared (i.e. less than well prepared) were the following: Irrigation (63,0%), Communication (58,3%), Management (57,9%), Equipment (logistics) (52,5%) and Landscape construction (36,0%). Respondents were satisfied (i.e. graduates more than well prepared) with the fields of learning of Horticulture (38,5%), Landscape design (30,2%) and Landscape construction (21,3%).

TABLE 6.16: LANDSCAPE FIELDS OF LEARNING INDICATING PREPAREDNESS OF GRADUATES

Fields of learning	Preparedness of graduates					
	N	Average (%)				
		Not prepared	Poorly prepared	Adequately prepared	Well prepared	Very well prepared
Horticulture	65	3,1	9,2	47,7	38,5	1,5
Landscape construction	61	9,8	26,2	42,7	19,7	1,6
Landscape design	63	3,2	14,3	52,3	28,6	1,6
Management	57	7,0	50,9	28,1	10,5	3,5
Communication	60	15,0	43,3	35,0	6,7	0
Irrigation	62	22,6	40,4	29,0	4,8	3,2
Equipment (logistics)	61	11,5	41,0	34,4	11,5	1,6
Other	9	44,5	11,1	33,3	11,1	0

6.4.1.2.5 Nursery production

A difference of only 7,7% exists between the Nursery production fields of learning with the highest (15,5%) and that with the lowest (7,8%) percentage (see Table 6.17).

Respondents in the survey accorded minor differences in importance to the nine fields of learning presented to them for evaluation, i.e. all carry fairly similar weightings. The combination of Cultivation/growing (15,5%), Plant knowledge (12,5%) and Propagation (11,7%) make up the technical component of this sector, a combination which could be identified as "plantsman skills" (i.e. 39,7%). Management comprises 12,4%, Communication 8,5% and Marketing 7,8%, i.e. 28,7% of the total. Skills/competencies listed under "other" were:

Labour relations
Soil science
Equipment

TABLE 6.17: NURSERY PRODUCTION FIELDS OF LEARNING IN ORDER OF IMPORTANCE IN CURRICULUM (TIME)

Fields of learning	Importance of Fields of learning	
	Rank order	%
Cultivation/growing	1	15,5
Plant knowledge	2	12,5
Management	3	12,4
Propagation	4	11,7
Pest, weed and disease management	5	10,6
Nursery development and maintenance	6	10,3
Irrigation	7	9,8
Communication	8	8,5
Marketing	9	7,8
Other	10	0,9
TOTAL	_	**100,0**

The results of the tests indicated that in this sector there again were significant differences regarding the preparedness of graduates among the Nursery production fields of learning,

furthermore that when "others" were left out of the test, there were also significant differences regarding the preparedness of graduates in the fields of learning. Table 6.18 indicates that respondents were satisfied (i.e. more than well prepared) with the fields of learning of Propagation (40,4%), Plant knowledge (33,3%), Cultivation/growing (28,8%), Nursery development and maintenance (26,9%) and Pest, weed and disease management (25,9%).

TABLE 6.18: NURSERY PRODUCTION FIELDS OF LEARNING INDICATING PREPAREDNESS OF GRADUATES

Fields of learning	Preparedness of graduates					
	N	Average (%)				
		Not prepared	Poorly prepared	Adequa-ely prepared	Well prepared	Very well prepared
Cultivation/growing	52	5,8	13,5	51,9	25,0	3,8
Plant knowledge	51	2,0	11,8	52,9	25,5	7,8
Management	50	24,0	26,0	40,0	8,0	2,0
Propagation	47	6,4	10,6	42,6	34,0	6,4
Pest, weed and disease management	54	7,4	14,8	51,9	22,2	3,7
Nursery development and maintenance	52	11,5	19,2	42,4	17,3	9,6
Irrigation	53	20,8	30,2	30,2	17,0	1,8
Communication	52	15,4	30,8	42,3	11,5	0
Marketing	48	25,0	35,4	29,2	8,3	2,1
Other	15	20,0	20,0	0	60,0	0

The fields of learning which respondents felt that graduates were inadequately prepared for (i.e. less than poorly prepared) were Marketing (60,4%), Irrigation (51,0%), Management (50,0%) and Communication (46,2%). Skills/competencies of a managerial nature are seen to be a greater problem than horticultural/technical skills. The ratio of technical skills to managerial skills (excluding other) in terms of importance is 70,4% to 28,7% (see Table 6.18).

6.4.1.2.6 Nursery retail

The most important Nursery retail field of learning identified by respondents was that of Plant knowledge (23,5%), accounting for close to 25% of the curriculum (see Table 6.19). The most important horticultural skills/competencies (total 46,1%) for this sector relate to

Plant knowledge, Pest, weed and disease management (12,2%) and Landscape (10,4%). Management (13,7%), Communication (13,4%) and Retailing (11,1%) make up 38,2% of the curriculum as the managerial component. Fields of learning of lesser importance were Environmental management (8,7%) and Soil science (6,7%). The only skills/competency listed under "other" was that of equipment.

TABLE 6.19: NURSERY RETAIL FIELDS OF LEARNING IN ORDER OF IMPORTANCE IN CURRICULUM (TIME)

Fields of learning	Importance of Fields of learning	
	Rank order	%
Plant knowledge	1	23,5
Management	2	13,7
Communication	3	13,4
Pest, weed and disease management	4	12,2
Retailing	5	11,1
Landscape	6	10,4
Environmental management	7	8,7
Soil science	8	6,7
Other	9	0,3
TOTAL	_	**100,0**

The results of the tests indicated that for this sector there again were significant differences regarding the preparedness of graduates among the Nursery retail fields of learning, furthermore that when "others" were left out of the test, there were also significant differences regarding the preparedness of graduates in the fields of learning. Table 6.20 indicates that respondents regarded graduates to be the most prepared (i.e. more than well prepared) in Plant knowledge (38,5%) and Pest, weed and disease management (28,3%).

Respondents indicated however that graduates were generally poorly prepared in most fields of learning (i.e. less that poorly prepared): Retailing (55,2%), Soil science (54,4%), Management (54,1%), Communication (53,1%), Environmental management (46,7%), Landscape (30,4%) and Pest, weed and disease management (30,2%). Respondents appeared to be more satisfied with the horticultural fields of learning as opposed to the managerial.

TABLE 6.20: NURSERY RETAIL FIELDS OF LEARNING INDICATING PREPAREDNESS OF GRADUATES						
Fields of learning	**Preparedness of graduates**					
	N	**Average (%)**				
		Not prepared	**Poorly prepared**	**Adequat-ely prepared**	**Well prepared**	**Very well prepared**
Plant knowledge	52	3,8	9,6	48,1	25,0	13,5
Management	48	20,8	33,3	37,5	6,3	2,1
Communication	49	18,4	34,7	30,6	12,2	4,1
Pest, weed and disease management	53	13,2	17,0	41,5	22,6	5,7
Retailing	49	22,4	32,8	26,5	12,2	6,1
Landscape	46	4,3	26,1	58,7	10,9	0
Environmental management	45	20,0	26,7	48,9	4,4	0
Soil science	46	17,4	37,0	30,4	15,2	0
Other	11	25,0	25,0	25,0	0	25,0

6.4.1.2.7 Turf

While Management was the third most important field of learning in the Turf sector with 14,9% of the response, no other management related fields were mentioned. For example, communication and marketing are presumed to have been included in the Management field of learning (see Table 6.21). All other fields total 85,1% of the response and are a clear indication of the importance of the technical fields. Each of the seven fields of learning listed carries similar levels of importance, varying between 15,6% and 8,4%. The most important fields of learning were those of Irrigation (15,6%) and Pest, weed and disease management (15,2%), both of which are critical to the survival of turfgrass.

Construction (12,9%) is an important aspect of the horticulturist's (greenkeeper's) job as this relates to the building of new facilities and the reconstruction of played out sportsfields. Agronomy/cultural practices (12,2%), Mechanization (10,7%) and Soil science (9,2%) are also critical fields of learning as is the last-mentioned, Environmental management (8,4%).

TABLE 6.21: TURF FIELDS OF LEARNING IN ORDER OF IMPORTANCE IN CURRICULUM (TIME)		
Fields of learning	**Importance of Field of learning**	
	Rank order	**%**
Irrigation	1	15,6
Pest, weed and disease management	2	15,2
Management	3	14,9
Construction	4	12,9
Agronomy/cultural practices	5	12,2
Mechanization	6	10,7
Soil science	7	9,2
Environmental management	8	8,4
Other	9	0,9
TOTAL	_	**100,0**

The skills/competencies listed under other were:

Training
Landscape maintenance (3)
Technical equipment (2)
Pathology
Irrigation equipment

TABLE 6.22: TURF FIELDS OF LEARNING INDICATING PREPAREDNESS OF GRADUATES						
Fields of learning	**Preparedness of graduates**					
	N	**Average (%)**				
		Not prepared	**Poorly prepared**	**Adequat-ely prepared**	**Well prepared**	**Very well prepared**
Irrigation	41	19,5	43,9	24,4	7,3	4,9
Pest, weed and disease management	41	2,4	26,8	51,3	14,6	4,9
Management	40	22,5	45,0	20,0	10,0	2,5
Construction	38	26,3	29,0	39,5	2,6	2,6
Agronomy/cultural practices	38	15,8	34,2	39,5	2,6	7,9
Mechanization	40	10,0	35,0	35,0	17,5	2,5
Soil science	36	11,1	30,6	38,9	16,7	2,7
Environmental management	40	17,5	32,5	45,0	2,5	2,5
Other	7	0	66,7	33,3	0	0

As mentioned in Paragraph 6.4.1.1 above, the results of the tests indicated that there were not significant differences regarding the preparedness of graduates in the Turf fields of learning, however that when "others" were left out of the test, there were significant differences regarding the preparedness of graduates in the fields of learning. Table 6.21 indicates that Irrigation was considered by respondents to be the most important field of learning in terms of curriculum time and in Table 6.22 Irrigation is shown to be the field of learning with the second greatest deficiency in graduate preparedness (45,8% for less than poorly prepared). The fields of learning of Mechanisation (20,0%), Pest, weed and disease management (19,5%) and Soil science (19,4%) drew the most positive response, though for all of these a greater negative response was still recorded. Graduates were seen as being inadequately prepared (i.e. less than poorly prepared) in the following: Management (67,5%), Irrigation (63,4%), Construction (55,3%), Agronomy/cultural practices (50,0%), Environmental management (50,0%), Mechanisation (45,0%), Soil science (41,7%) and Pest, weed and disease management (29,2%). The above indicates serious deficiencies in all fields of learning in this sector.

The following paragraph will present a summary of the process followed in identifying the fields of learning for each sector, together with a tabulated summary of the response of the mail survey.

6.4.1.3 Summary of process followed in identifying clusters of fields of learning per sector

In the previous chapter, emphasis was placed upon the outcome of the focus group interviews into the fields of learning. The fields of learning that were identified by the individual focus groups (for each sector) were tabulated together with an estimated aggregation or clustering of these across focus groups (see Paragraph 5.7.1). In the tabulation, fields of learning were also listed in rank order of importance as indicated by the focus groups. The indicator of importance used was the amount of exposure (or time) in the curriculum that focus group participants expected students to spend on each field of learning within the seven sectors. The total of 25 fields of learning, as identified by the different sectors, was presented in a concluding summary. Table 5.18 presented this summary, showing the fields of learning grouped into the two major clusters of horticulture

and management. The former included 17 fields of learning and the latter eight fields of learning.

In the mail questionnaire survey, respondents in each sector were provided with an amended list of the fields of learning identified by the focus group interviews. The need to amend the list of fields of learning was explained in Paragraph 6.4.1 and related to the requirement that ambiguity should be eliminated in a self-administered mail survey. In the mail survey, respondents were asked a) to add any additional fields of learning, b) to weight each field of learning with a percentage total according to their opinion of the importance of each field of learning (i.e. indicating the percentage exposure or time) in a curriculum for that sector, and c) how well they regarded graduates to be prepared for each field of learning. The results of this question were reported in Paragraph 6.4.1 where the responses to b) and c) above were reported in tabular form for each sector.

The fields of learning that were identified in the mail survey have been presented in Table 6.23 in a comparable format to that used in presenting those identified in the focus group interviews (see Table 5.18). A composite presentation of the mail survey's response to the importance of each field of learning has been indicated in this table. As the mail survey was an extension of the focus group interviews, the results represented in this table may be regarded as the culmination of the outcome of both research techniques. This table has again been clustered into the two clusters of horticultural and managerial fields of learning and indicates the percentage allocation to each field of learning within sectors.

The total allocation for horticultural as opposed to managerial is indicated as 65,8% to 33,0% (and other 1,2%), which is not too different from the ratio that was indicated by the focus group interviews (62,7% to 37,3%). While this ratio does vary to an extent within sectors (e.g. 61,7% to 35,5% for Amenity horticulture and 84,2% to 14,9% for Turf), this clustering of the fields of learning does serve as a useful means of clustering technical to non-technical fields of learning. An approximate division of 60% to 40% of horticultural to managerial seems appropriate, also across most sectors. The low percentage of "other" has been discounted as these skills/competencies could have been placed in one of the other two clusters.

Table 6.23: Summary of clusters of fields of learning per sector indicating order of importance as identified by mail survey (%)										
Clusters of fields	**Fields of learning**	**Amenity horticulture**	**Arboricul-ture**	**Floricul-ture**	**Landscape**	**Nursery production**	Nursery retail	Turf	Total	Total cluster %
1. Horticulture	Plant knowledge			23,9		12,5	23,5		59,9	
	Pest, weed and disease management			19,1		10,6	12,2	15,2	57,1	
	Horticulture	28,7			20,2				48,9	
	Environmental Management	13,0	15,6				8,7	8,4	45,7	
	Irrigation				10,9	9,8		15,6	36,3	
	Landscape	20,0					10,4		30,4	
	Arboricultural skills		28,9						28,9	
	Landscape construction				17,5				17,5	
	Landscape design				17,4				17,4	
	Soil science						6,7	9,2	15,9	
	Cultivation/ growing					15,5			15,5	
	Construction							12,9	12,9	
	Agronomy/ cultural practices							12,2	12,2	
	Propagation					11.7			11,7	
	Harvesting and post- harvesting			11,3					11,3	
	Mechanisation							10,7	10,7	
	Nursery development and maintenance					10,3			10,3	
	Techniques/ equipment/ structures			9,3					9,3	
	Equipment /logistics				8,8				8,8	
	Total	61,7	44,5	63,6	74,8	70,4	61,5	84,2	460,7	65,8
2. Management	Management	24,1	22,8	14,3	13,2	12,4	13,7	14,9	115,4	
	Communication			11,7	10,9	8,5	13,4		44,5	
	Economics and marketing			10,3		7,8			18,1	
	Education/ training		15,3						15,3	
	Arboriculture and the law		15,3						15,3	
	Community recreation	11,4							11,4	
	Retailing						11,1		11,1	
	Total	35,5	53,4	36,3	24,1	28,7	38,2	14,9	231,1	33,0
3. Others	Other (various)	2,8	2,1	0,1	1,1	0,9	0,3	0,9	8,2	1,2
	Grand total	100,0	100,0	100,0	100,0	100,0	100,0	100,0	700,0	100,0

It will be noted from Table 6.23 that particular sectors did not identify certain fields of learning that one may reasonably have expected to be identified by one of the research techniques utilised. The reason for this is that respondents did not have clear definitions of what was included in specific fields of learning and respondents in many cases saw certain fields of learning as including others or parts of others. Many respondents in the focus group interviews stated that for example the Horticulture field of learning included Irrigation and that Management included Communication. The researcher therefore retained the integrity of the responses received in both the focus group interviews and the mail questionnaire survey and only in his own conjecture did he assume any respondent interpretations. This was regarded as important to the maintenance of the validity of the research as the provision of a list of possible fields of learning with specific definitions of each would have been a source of researcher bias.

The following paragraph will present a summary, as indicated by the mail survey, of the inadequately preparedness of graduates for the different fields of learning. This will also be juxtaposed to the response from the focus group interviews regarding the aspects of their jobs that horticulturists are seen to struggle with.

6.4.1.4 Summary of adequately and inadequately preparedness of graduates in the fields of learning per sector

The question that asked respondents in the mail survey to indicate how well they considered graduates to have readied or prepared themselves for each field of learning (see Question 8b, Table 3.4) was aimed at an evaluation of the effectiveness of current programmes. This evaluation did however ask respondents to evaluate current programmes in terms of the identified fields of learning. As the terminology used in naming the fields of learning originated from the focus group respondents, no problems were anticipated in asking respondents to evaluate these.

This evaluation will serve the purpose in this study of indicating to the technikons that offer programmes in horticulture, the fields of learning that are deficient in content and in teaching and learning. The following highlights this point: Of the respondents that answered the Arboriculture sector part of this question, 62,5% stated that graduates are less than poorly prepared for the "Arboriculture and the law" field of learning. This and

many other deficiencies is a serious pointer to the inadequacies in the current curricula. Fields of learning that are adequately offered in current curricula have also been highlighted and this aspect of existing teaching and learning is also of key importance.

A further reason for addressing the preparedness of graduates is that should the response to this question be compared and a correlation found to the question to focus group respondents (Question 8, Table 3.2) to identify those aspects of the job with which horticulturists struggle, a clear indication will have been determined on where priorities should be placed in a revised curriculum. The question posed to focus group participants was not sector specific and was aimed at a general understanding of current deficiencies, while that to the mail survey respondents was sector specific. A direct comparison therefore of Table 5.19 to Tables 6.10, 6.12, 6.14, 6.16, 6.18, 6.20 and 6.22 is not possible. The following paragraph will however present a synopsis of the areas of comparability between the results of both research techniques and where these have indicated aspects of inadequacy.

Participants in the focus group interviews indicated (see Table 5.19) that qualified horticulturists struggle mostly with managerial skills (59,8%), followed by horticultural skills (26,3%) and personal skills (13,9%). A study of Paragraph 5.9 reveals that the type of individual skills that respondents were most concerned about were general managerial skills (e.g. project management, supervisory, stress management, quality assurance), financial skills (e.g. budgets, costing schedules, business plans) and interpersonal skills (e.g. staff and customer skills, conflict resolution). Respondents in the mail survey indicated parallel concerns. In studying those fields of learning within each sector that respondents indicated graduates to be less than poorly prepared (see Tables 6.10, 6.12, 6.14, 6.16, 6.18, 6.20 and 6.22), a ratio of 50,6% to 49,4% for managerial to horticultural clusters of fields of learning is demonstrated.

A summary of the sector-specific inadequacies in the preparedness of graduates is presented in Table 6.24, in which this ratio is set forth. This table also indicates which specific fields of learning are areas of concern to individual sectors. The fields of learning of concern to two or more sectors were Managerial, Communication, Economics and Marketing, Environmental management, Irrigation, Soil science, Technical/ equipment/ structures and Pest, weed and disease management.

Table 6.24: Summary of sector-specific inadequacies in preparedness of graduates										
Clusters of fields	**Fields of learning**	**Sector-specific inadequacies in preparedness (less than poorly prepared)***								
		Amenity horticulture	**Arboriculture**	**Floriculture**	**Landscape**	**Nursery production**	**Nursery retail**	**Turf**	**Total**	**Total Cluster %**
1. Managerial	Managerial	61,4	65,1	59,5	57,9	50,0	54,1	67,5	415,5	
	Communication			25,0	58,3	46,2	53,1		182,6	
	Economics & marketing			61,8		60,4			122,2	
	Retailing						55,2		55,2	
	Education & training		53,8						53,8	
	Community recreation	50,0							50,0	
	Arboriculture & the law		62,5						62,5	
	Total	111,4	181,4	146,3	116,2	156,6	162,4	67,5	941,8	50,6
2. Horticulture	Environmental management	50,0	50,0				46,7	50,0	196,7	
	Irrigation				63,0	51,0		63,4	177,4	
	Pest weed & disease management						30,2	29,2	59,4	
	Mechanisation							45,0	45,0	
	Technical / equipment / structures			39,4	52,5				91,9	
	Arboricultural skills		48,7						48,7	
	Harvesting & post-harvesting			33,4					33,4	
	Landscape construction				36,0				36,0	
	Soil science						54,4	41,7	96,1	
	Landscape						30,4		30,4	
	Construction							55,3	55,3	
	Agronomy / cultural practices							50,0	50,0	
	Total	50,0	98,7	72,8	151,5	51,0	161,7	334,6	920,3	
	Grand total	161,4	280,1	219,1	267,7	207,6	324,1	402,1	1862,1	49,4

*(% as indicated in Tables 6.10, 6.12, 6.14, 6.16, 6.18, 6.20, 6.22)

The fields of learning where graduates were considered to be more than well prepared were the following (sectors listed in brackets):

Cultivation/growing (Nursery production)
Education/training (Arboriculture)
Horticulture (Amenity horticulture and Landscape)
Landscape (Amenity horticulture)
Landscape construction (Landscape)
Landscape design (Landscape)
Mechanisation (Turf)
Nursery development and maintenance (Nursery production)
Pest, weed and disease management (Floriculture, Nursery production, Nursery retail and Turf)
Plant knowledge (Floriculture, Nursery production and Nursery retail)
Propagation (Nursery production)
Soil science (Turf)

Respondents indicated that for two or more sectors, graduates are adequately prepared in the fields of learning of Pest, weed and disease management, Plant knowledge and Horticulture.

The above discussion has indicated that there are certain broad areas (clustered fields of learning) as well as specific minor skills/competencies that are of concern to respondents from both research techniques. It is certainly indicated by this study that skills of an "everyday" nature cannot be assumed to occur in the training of horticulturists and that a concerted effort needs to be made to ensure that these are included in a revised curriculum.

The following paragraph will combine the results identified in the foregoing Paragraphs 6.4.1.3 and 6.4.1.4 and will present a summary of the importance of each sector's fields of learning as well as the level of preparedness of graduates. This synopsis forms the end-product of this study's investigation into the most preferred fields of learning for each sector and will endeavour to present a tabulated summation that could be used to guide the revision of existing curricula.

6.4.1.5 Categorisation of importance of fields of learning in a revised curriculum

In this paragraph, the core of that which has been said of the most important fields of learning for each sector as well as that reported of the preparedness of graduates will be studied in culmination of this aspect of the research. The objective of this process is firstly a crystallisation of the research into these two phenomena into a summated list of the most important fields of learning and secondly to determine to what extent each of these is important in a curriculum for specific sectors.

The following were accordingly borne in mind in arriving at the summated list, which follows as Table 6.25:

- Table 5.18 (Summary of clusters of fields of learning per sector identified by focus groups)
- Table 5.19 (Categorisation of skills horticulturists struggle with, indicating % of total mentions in rank order)
- Tables 6.10, 6.12, 6.14, 6.16, 6.18, 6.20, 6.22 (Per sector - fields of learning indicating preparedness of graduates)
- Table 6.23 (Summary of clusters of fields of learning per sector identified by mail survey)
- Table 6.24 (Summary of sector-specific inadequacies in preparedness of graduates)
- Table 6.35 (Summary of exposure (time) to all sectors as expressed by respondents in these sectors (in rank order))

Reference to Table 6.35 served the purpose of indicating to the researcher to what extent students within specific sectors should be exposed to other sectors.

A categorisation of a total of 18 fields of learning is presented in Table 6.25, in which the importance of each to its specific sector is indicated on a three-point scale, i.e. moderate importance, considerable importance and essential importance. The reduction of fields of learning from 25 (Table 6.23) to 18 (Table 6.25) was an attempt by the researcher to consolidate like fields of learning. Landscape, Landscape Design and Landscape Construction, for example, were combined to form a single Landscape field of learning.

The consolidated list of 18 fields of learning and the importance of each of these to the specific sector are indicated in Table 6.25. Use has been made of asterisks (*) which indicate for each sector an arbitrary total of 32 which the researcher has sub-divided so that each sector is able to identify its fields of learning and the comparative importance of each. It should be borne in mind that where one or more fields of learning have been identified as being of essential importance to a specific sector, this does not necessarily mean that they would bear the same credit rating in terms of hours of study.

Inspection of Table 6.25 reveals that certain fields of learning are more than considerably important to all sectors, e.g. Plant knowledge, Pest, weed and disease management, Horticulture, Management, Communication and Education and training. Those fields of learning that are more than considerably important to particular sectors are Irrigation, Arboriculture, Landscape, Mechanisation, Turf culture, Floriculture, Specialised propagation, Economics and marketing, Retailing, Arboriculture and the law and Community recreation. While each sector's fields of learning have been grouped into the clusters used throughout this research, i.e. horticulture and management, Table 6.25 indicates an unequal distribution of importance between these clusters in the different sectors. The horticulture cluster is most important to the Turf, Landscape and Nursery production sectors and the management cluster is most important to the Nursery retail and Amenity horticulture sectors. A number of fields of learning are of none to little significance to certain sectors, for instance Table 6.25 indicates that Retailing is only significant to Floriculture (considerable importance) and to Nursery retail (essential importance).

A foundation for the development of a curriculum in each of the seven sectors has been established, as set forth in Table 6.25. This table has been developed using all of the data listed in the tables referred to, but it does include the researcher's considered opinion and his interpretation of the data. He has endeavoured to remain as objective as possible during this process in order to avoid the inclusion of any bias.

Table 6.25 Categorisation of importance of fields of learning per sector as identified by all research techniques								
Clusters of fields of learning	**Fields of learning**	**Amenity horticulture**	**Arboriculture**	**Floriculture**	**Landscape**	**Nursery production**	**Nursery retail**	**Turf**
1. Horticulture	Plant knowledge	**	**	**	**	***	**	**
	Pest, weed and disease management	**	***	***	**	***	**	***
	Horticulture	**	***	***	**	***	***	**
	Environmental management	***	**	*	**	*	*	**
	Irrigation	*	*	**	***	**	**	***
	Arboriculture	***	***	*	**	*	*	**
	Landscape	**	*	*	***	*	**	**
	Mechanisation	**	***	**	***	**	*	***
	Turf culture	**	*		***	*	**	***
	Floriculture			***		**	*	
	Specialised propagation		*	**		***	*	*
	Total	19	20	20	22	22	18	23
2. Management	Management	***	***	***	***	***	***	***
	Communication	**	**	**	**	**	**	**
	Economics and marketing	*	*	***	**	**	***	*
	Retailing			**			***	
	Education/ training	**	**	**	**	**	**	**
	Arboriculture and the law	***	***		*	*	*	*
	Community recreation	**	*					
	Total	13	12	12	10	10	14	9
	Grand total	32	32	32	32	32	32	32
	Index * Moderate importance ** Considerable importance *** Essential importance							

In the following paragraph, the categorisation of the importance of fields of learning in a revised curriculum will be used to prepare a concept curriculum based upon the credits allocated to each field of learning.

6.4.1.6 Allocation of credits to fields of learning per sector in a concept curriculum framework

As was suggested above, the identification of the relative importance of the fields of learning serves as a foundation for the development of a concept curriculum framework for each of the seven sectors.

In an endeavour to further interpret the data presented in Table 6.25 and to present a concept curriculum framework, the researcher allocated a number of credits to each field of learning within each sector. Using SAQA's definition of a credit as equalling 10 notional learning hours and 360 credits being commensurate with three years of full-time study, a concept curriculum framework was prepared for the set of seven sectors identified in this research. This is presented in Table 6.26. As this has been based upon empirical data collected during the mail survey (Tables 6.23-6.25 and Table 6.35), it is presented with confidence, though some interpretation in its formulation, was necessary. Responsibility for the latter must lie with the researcher, though this has been based upon careful consideration of all facts.

A study of Table 6.26 reveals that each sector has been represented by the full number of credits for a three-year qualification, i.e. 360 credits. The allocation of credits to the horticultural and the managerial clusters has been based upon the ratio between these two clusters as determined in the mail survey. This framework tries to reflect the identified requirements within each sector, but to ensure at the same time that students are exposed to other sectors. This is in line with what was said earlier about horticulturists being requiired to be versatile and to be "flexible generalists". While this framework provides for a set curriculum for each sector, it could easily be adapted by the inclusion of elective modules, whereby candidates would be able to select a composite package of modules that would lead to a qualification which is suited to their particular requirements.

Table 6.26 Allocation of credits to fields of learning per sector based upon research data								
Clusters of fields of learning	**Fields of learning**	**Amenity horticulture**	**Arboriculture**	**Floriculture**	**Landscape**	**Nursery production**	**Nursery retail**	**Turf**
1. Horticulture	Plant knowledge	35	30	35	40	50	45	35
	Pest, weed and disease management	20	25	30	20	35	30	40
	Horticulture	35	40	35	20	45	50	30
	Environmental management	30	25	10	25	10	15	20
	Irrigation	10	10	20	30	20	15	30
	Arboriculture	30	50	5	10	10	20	15
	Landscape	30	15	15	60	10	25	15
	Mechanisation	20	15	15	20	15	10	30
	Turf culture	20	10	5	20	5	10	50
	Floriculture	5	5	45	5	10	5	5
	Specialised propagation	-	10	15	-	40	5	5
	Total	235	235	230	250	250	230	275
2. Management	Management	50	60	50	40	40	40	40
	Communication	20	20	25	20	20	20	20
	Economics and marketing	20	5	30	25	30	35	10
	Retailing	-	5	10	5	5	20	-
	Education/ training	10	20	10	10	10	10	5
	Arboriculture and the law	5	10	-	5	-	-	5
	Community recreation	20	5	5	5	5	5	5
	Total	125	125	130	110	110	130	85
	Grand total	360	360	360	360	360	360	360

Note:
1 SAQA credit = 10 notional hours of learning
360 credits = Approximately 3 years full-time study

Following the determination of the fields of learning for each sector and the credit ratings for each, the allocation of specific skills/competencies to each of the fields of learning would be the next step in the design of a revised curriculum. This is discussed in the following paragraph.

6.4.2 Identification of specific skills/competencies

The identification of the specific skills/competencies that constitute each field of learning is an important component of this study, particularly as this has been established for each sector. In the design of a curriculum for horticulture, where a variety of sectors exist and where these sectors all use a great variety of similar skills/competencies, the identification of those that are generic as well as those that are sector-specific is important. This study has endeavoured to identify these, but has not attempted to determine the importance nor the extent or scope of each specific skill/competency.

Respondents in both the focus group interviews and the mail survey were requested to list at least seven specific skills/competencies that they considered as being important to each of the fields of learning for that sector. This question in the mail questionnaire was a direct follow-up to that asked of the focus groups and was aimed at obtaining greater coverage of what specific skills/competencies constitute each field of learning. Respondents were asked a) to name their sector, b) to write in the names of the fields of learning in their sector and c) to list the specific skills/competencies within each field of learning.

This question required considerable time and effort of respondents, yet was completed by 53% of all respondents. All responses have been listed under the specific sectoral fields of learning and these provide curriculum writers with a useful checklist of those specific skills/competencies of what should be included in a proposed curriculum. Appendix 5.1 represents the specific skills/competencies identified by the focus groups and Appendices 6.1 to 6.7 those identified by the mail survey. These should be read in combination so that a fuller representation is obtained. It should also be noted that the researcher has tried to retain the original wording as far as possible. The value of retaining the wording used by respondents assists in preserving the depth of meaning, which is a central characteristic of qualitative research.

The following paragraph studies those attributes that employers seek or expect to find in a horticulturist coming into their employ.

6.4.3 Attributes employers desire in a horticulturist

The focus group interviews served to identify 14 broad attributes (i.e. characteristic qualities) which employers desire in a horticulturist entering into their employment (see Paragraph 5.3). In the mail questionnaire, respondents were provided with these same attributes, which were listed in alphabetical order. Respondents were asked to rate in their opinion the degree of importance of each and secondly to indicate to what degree horticulturists were seen to be successful in achieving these. The 5-point Likert-type scale for importance ranged between no importance, low importance, average importance, fair importance and extreme importance. A similar scale was used for achievement that ranged between no achievement, low achievement, average achievement, good achievement and excellent achievement.

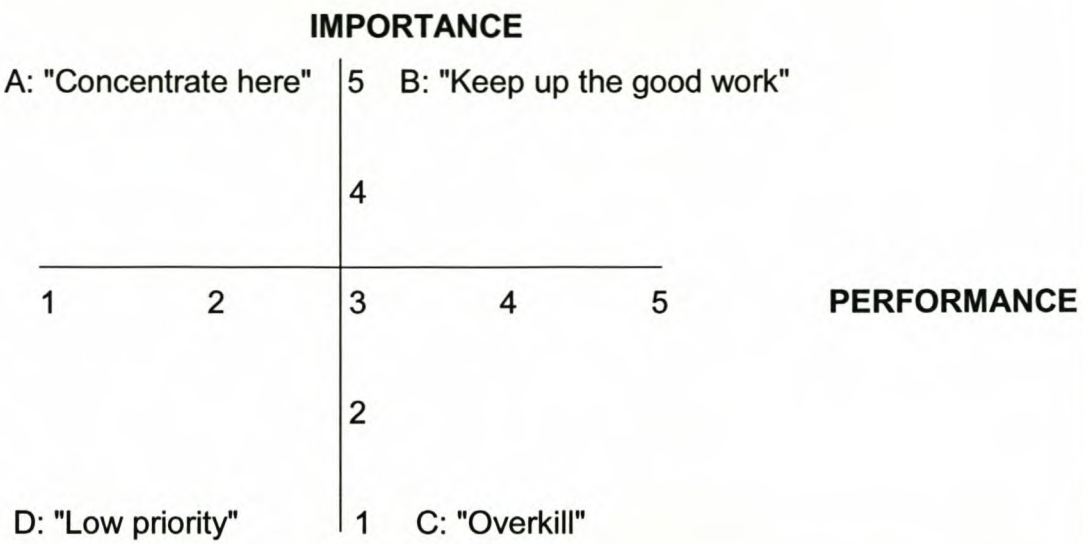
The evaluation of the importance and the level of achievement of attributes employers may expect to find in a horticulturist were seen as one of the more important questions in the survey. The use of a 5-point Likert-scale for both parts of this question was planned to enable the researcher to place the results of the survey onto an Importance-Performance Analysis (IP-A) graph as discussed in Paragraph 3.4.3.5 (see Figure 6.1). The latter enables the reader to read off at a glance, which of the attributes are either high or low in importance as well as which have low or high levels of performance (or in this study achievement). Mean figures for both importance and achievement have been calculated for each of the 14 attributes and are listed in Table 6.27.

The position of these is indicated on the IP-A graph (see Figure 6.2). This graph has been drawn so that it has four quadrants, from top left (in clockwise direction) entitled "concentrate here", "keep up the good work", "overkill" and "low priority". Figure 6.2 demonstrates the Importance-Performance Analysis graph (note the four quadrants).

Figure 6.2 clearly demonstrates that all of the identified attributes are between fair (4 on the Likert scale) and extreme (5 on the Likert scale) in importance and between more than average (3 on Likert scale) and good (4 on Likert scale) in achievement. While all attributes can be regarded as being of great importance to employers, horticulturists

entering employment are not seen to be achieving comparable success in their application of all attributes.

FIGURE 6.1: IMPORTANCE-PERFORMANCE ANALYSIS GRAPH



(Martilla & James 1977: 77-79)

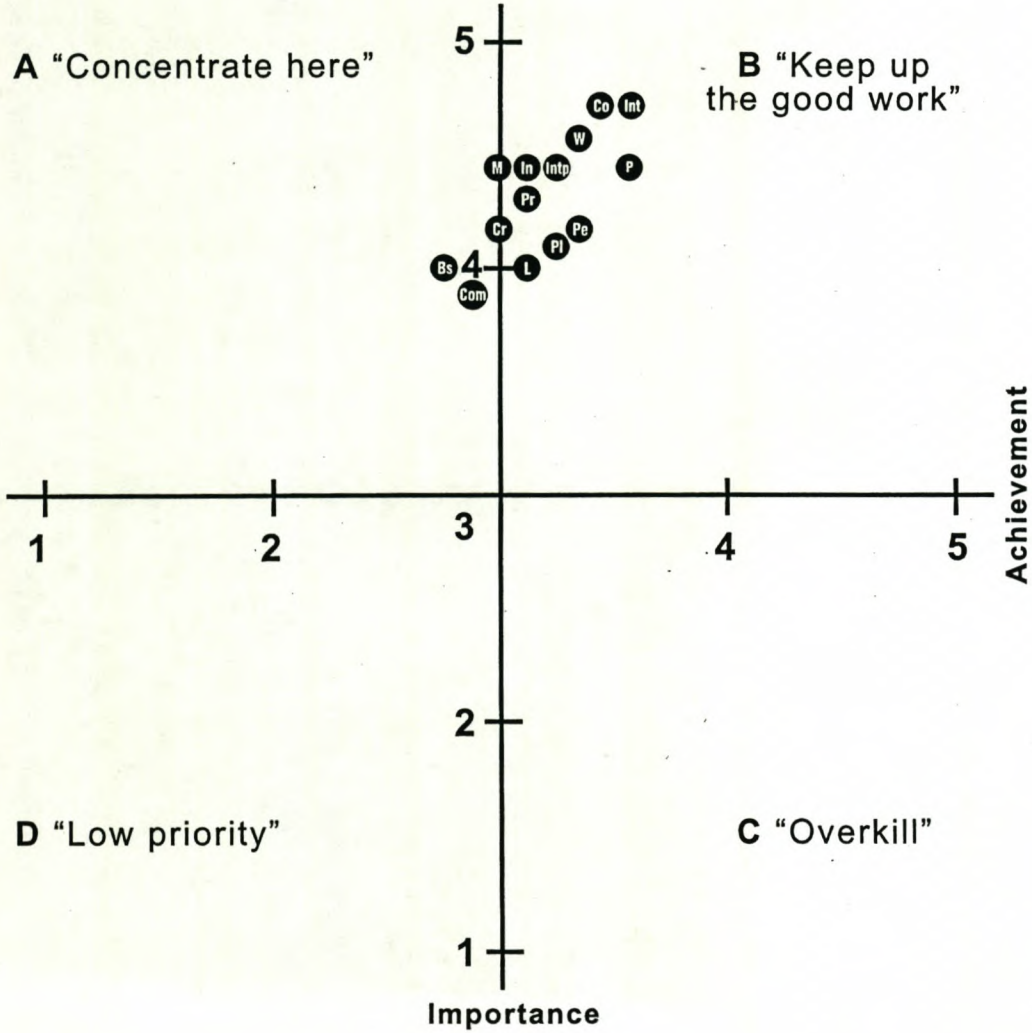
The attributes of integrity and a passion for plants received the highest scores and business skills and communication and computer literacy, the lowest scores in achievement. The latter were less than average achievement, though in most attributes a score of only slightly higher than average was the norm. Despite the fact that most attributes occur within the B quadrant ("Keep up the good work"), they are congregated in the lowest sector of this quadrant.

A comparison of the most important attributes indicated by the focus groups as opposed to those indicated by the mail survey, indicates that considerable disparity exists between the two (compare Tables 5.2 and 6.27). Integrity was scored the lowest by the focus groups, yet in the mail survey it received the highest rating. Commitment, on the other hand, was scored the highest by the focus groups and together with integrity, the highest by the mail survey. The reason for this is that the focus group participants were not provided with a list of attributes and were asked to develop their own. Respondents to the mail survey were provided with the list generated by the focus groups and were simply asked to rate these

from no importance to extreme importance. These were listed alphabetically to avoid any indication of possible importance.

TABLE 6.27: LIST OF ATTRIBUTES SHOWING THE MEAN FOR IMPORTANCE AND FOR ACHIEVEMENT

Reference	Attributes	Importance (mean)	Achievement (mean)
Int	Integrity (honesty, sincerity, work ethics)	4,7	3,5
Co	Commitment (responsibility, dedication, being hardworking, accuracy)	4,7	3,4
W	Willingness to learn and ability	4,5	3,3
In	Initiative (being a self-starter, self-motivation)	4,4	3,1
Intp	Interpersonal relations (people skills, staff and clients)	4,4	3,2
M	Management skills (also planning and organising)	4,4	3.0
P	Passion for plants and the environment	4,4	3,5
Pr	Problem-solving (also practical application)	4,3	3,1
Pe	Personal growth, development and confidence	4,2	3,3
Cr	Creativity (lateral thinking, innovation)	4,2	3,0
Pl	Plant management and technical skills	4,1	3,2
L	Leadership skills	4,0	3,1
Bs	Business skills (also professionalism)	4,0	2,8
Com	Communication and computer literacy	3,9	2,9



KEY		
Int	-	Integrity
Co	-	Commitment
W	-	Willingness to learn & ability
In	-	Initiative
Intp	-	Interpersonal relations
M	-	Management skills
P	-	Passion for plants & environment
Pr	-	Problem solving
Pe	-	Personal growth
Cr	-	Creativity
Pl	-	Plant management & technical skills
L	-	Leadership skills
Bs	-	Business skills
Com	-	Communication & computer literacy

FIGURE 6.2: GRAPH SHOWING IMPORTANCE ACHIEVEMENT ANALYSIS

Every attribute on this list was rated between 3,9 and 4,7 (maximum was 5,0) in importance, which indicates that all of the listed attributes were considered to be "extremely important". The fact that the focus groups placed attributes like integrity and a willingness to learn at the lower end of their importance rating was that they simply had not considered these.

The conclusion to be arrived at from this phenomenon is that a two-way process is in fact required in developing a priority rating of attributes of this nature. The first stage is that full consideration should be given to developing a comprehensive list of all the possible attributes or variables. After agreement on the completeness of this list, the second stage may follow where the same or other parties are asked to rate each of the listed attributes, whether this be in importance or in any other criteria.

Bearing in mind the high importance placed by the mail survey upon all of the attributes, every effort should be made in curriculum development and in teaching and learning to raise the level of achievement. This is particularly necessary where the mail survey indicated that certain attributes were only receiving average achievement. Of particular note are initiative, management skills, problem-solving, creativity, leadership skills, business skills and communication and computer literacy. Table 6.27 indicates that all of the listed attributes should receive attention as the highest rating of 3,5 is still well below all of the importance ratings. The illustration in Figure 6.2 of the criteria of importance and achievement in the Importance Performance-Analysis graph has served a useful purpose in presenting the outcome of this question in an understandable and graphical manner.

The following paragraph reports upon the relationship between sectors that respondents regarded as being relevant in providing for cross-sector exposure when preparing a curriculum for horticulture.

6.4.4 Relationship between sectors in terms of exposure to other sectors in curriculum development

The inclusion of this question was considered important to the identification of the extent of the need for horticulturists to be either specialists or generalists. A broad overlap of skills and competencies has traditionally existed between the varying sectors, so much so that

to many in the industry, horticulturists are regarded as having to be so versatile that they are able to work in different sectors without much adaptation.

Respondents were asked to consider, in preparing a course of study, how they in their opinion, they would subdivide a student's time (or exposure) between their specific sectors and all other sectors (see Question 11, Table 3.4). This subdivision was to be indicated as percentages, totaling to 100%. Respondents were instructed that they could indicate a 100% to their sector if they believed that a student should be fully specialised in that particular sector.

The responses to each of the sectors have been individually dealt with in the paragraphs below. The number of respondents per sector (N) has been indicated on each of the tables and indicates the number of respondents who responded to each sector. Many respondents responded to this question from the perspective of more than one sector.

A study of each of the tables below indicates that respondents have allocated the highest percentage exposure to their sector, but high allocations are also made to what could be considered complementary sectors (e.g. Turf and Landscape). Low allocations were made to sectors with little in common with the respondent's sector.

6.4.4.1 Amenity horticulture

Table 6.28 indicates that respondents in this sector recommend that students spend 45,5% of their time concentrating on their sector, 28,4% on Arboriculture, 9,0% on Landscape and 8,5% on Turf.

TABLE 6.28: EXPOSURE TO OTHER SECTORS BY STUDENTS IN AMENITY HORTICULTURE (N 51)

Sectors	Exposure (time) %
Amenity horticulture	45,5
Arboriculture	28,4
Floriculture	2,4
Landscape	9,0
Nursery production	2,4
Nursery retail	3,8
Turf	8,5
TOTAL	**100,0**

The other sectors were generally seen as of less importance. One would presume however that for students studying for a career in botanical gardens, Nursery production would also be important, i.e. more than the 2,4% accorded by respondents.

6.4.4.2 Arboriculture

From Table 6.29 it is clear that students in Arboriculture should be exposed to Landscape (29,4%) and Turf (28,5%) and to less than 5% in each of the other sectors (e.g. only 1,7% of the curriculum should be devoted to Floriculture). Arboriculture skills should comprise 30,1% of the curriculum.

TABLE 6.29: EXPOSURE TO OTHER SECTORS BY STUDENTS IN ARBORICULTURE (N 72)

Sectors	Exposure (time) %
Amenity horticulture	3,0
Arboriculture	30,1
Floriculture	1,7
Landscape	29,4
Nursery production	2,7
Nursery retail	4,6
Turf	28,5
TOTAL	**100,0**

6.4.4.3 Floriculture

As indicated in Table 6.30 respondents recommend that students spend 50,0% of their time on Floriculture, 26,1% on Landscape and 13,0% on Nursery production. All other sectors were to be given minimal exposure (all less than 3,6%).

TABLE 6.30: EXPOSURE TO OTHER SECTORS BY STUDENTS IN FLORICULTURE (N 54)

Sectors	Exposure (time) %
Amenity horticulture	3,6
Arboriculture	2,9
Floriculture	50,0
Landscape	26,1
Nursery production	13,0
Nursery retail	1,5
Turf	2,9
TOTAL	**100,0**

6.4.4.4 Landscape

From Table 6.29 it is clear that students in Arboriculture should be exposed to Landscape (29,4%) and Turf (28,5%) and to less than 5% in each of the other sectors (e.g. only 1,7% of the curriculum should be devoted to Floriculture). Arboriculture skills should comprise 30,1% of the curriculum.

TABLE 6.31: EXPOSURE TO OTHER SECTORS BY STUDENTS IN LANDSCAPE (N 63)	
Sectors	**Exposure (time) %**
Amenity horticulture	9,7
Arboriculture	7,0
Floriculture	3,5
Landscape	52,4
Nursery production	7,5
Nursery retail	5,4
Turf	14,5
TOTAL	**100,0**

Table 6.31 indicates that students are being advised to spend approximately half of their course (52,4%) on Landscape, their sector major. Other important sectors were seen to be Turf (14,5%), Amenity horticulture (9,7%), Nursery production (7,5%) and Arboriculture (7,0%). Other sectors were scored less than 5,4%.

6.4.4.5 Nursery production

The specialised nature of this sector's operations presumably led respondents to allocate 60,9% of a curriculum to aspects specific to Nursery production (see Table 6.32).

TABLE 6.32: EXPOSURE TO OTHER SECTORS BY STUDENTS IN NURSERY PRODUCTION (N 35)	
Sectors	**Exposure (time) %**
Amenity horticulture	4,3
Arboriculture	11,8
Floriculture	4,7
Landscape	8,6
Nursery production	60,9
Nursery retail	6,1
Turf	3,6
TOTAL	**100,0**

All other sectors were scored less than 11,8% (Arboriculture). Landscape was scored 8,6%, Nursery retail 6,1% and Floriculture 4,7%.

6.4.4.6 Nursery retail

Table 6.33 indicates that respondents representing this sector appear to require a broader exposure to other sectors for entrants into their sector. Nursery retail was scored the highest (31,2%), followed by Nursery production (19,1%), Arboriculture (14,8%), Amenity horticulture (11,6%) and Floriculture (10,1%). Other sectors were scored less than 7,9%.

TABLE 6.33: EXPOSURE TO OTHER SECTORS BY STUDENTS IN NURSERY RETAIL (N 70)

Sectors	Exposure (time) %
Amenity horticulture	11,6
Arboriculture	14,8
Floriculture	10,1
Landscape	5,3
Nursery production	19,1
Nursery retail	31,2
Turf	7,9
TOTAL	**100,0**

6.4.4.7 Turf

Respondents in this sector (see Table 6.34) also considered their sector to be specialised, scoring 67,9% for Turf. Landscape (11,5%) and Arboriculture (8,6%) are both complementary sectors. Other sectors were scored less than 4,6%.

TABLE 6.34: EXPOSURE TO OTHER SECTORS BY STUDENTS IN TURF (N 74)

Sectors	Exposure (time) %
Amenity horticulture	4,6
Arboriculture	8,6
Floriculture	3,3
Landscape	11,5
Nursery production	2,5
Nursery retail	1,6
Turf	67,9
TOTAL	**100,0**

6.4.4.8 Summary of responses in terms of relationship between sectors

In an endeavour to compare the levels of exposure respondents within the different sectors expect of entrants across the seven sectors, Table 6.35 lists the responses across all sectors (as described in detail in Paragraphs 6.4.4.1 to 6.4.4.7 above). The responses for each sector have been totalled, percentages calculated for each and the sectors placed in rank order.

TABLE 6.35: SUMMARY OF EXPOSURE (TIME) TO ALL SECTORS AS EXPRESSED BY RESPONDENTS IN THESE SECTORS (IN RANK ORDER)

	Sectors indicating exposure to other sectors									
Sectors	**Amenity horticulture**	**Aboriculture**	**Floriculture**	**Landscape**	**Nursery production**	**Nursery retail**	**Turf**	**Total**	**Rank order**	**%**
Landscape	9,0	29,4	26,1	52,4	8,6	5,3	11,5	142,3	1	20,4
Turf	8,5	28,5	2,9	14,5	3,6	7,9	67,9	133,8	2	19,1
Nursery production	2,4	2,7	13,0	7,5	60,9	19,1	2,5	108,1	3	15,4
Arboriculture	28,4	30,1	2,9	7,0	11,8	14,8	8,6	103,6	4	14,8
Amenity horticulture	45,5	3,0	3,6	9,7	4,3	11,6	4,6	82,3	5	11,8
Floriculture	2,4	1,7	50,0	3,5	4,7	10,1	3,3	75,7	6	10,8
Nursery retail	3,8	4,6	1,5	5,4	6,1	31,2	1,6	54,2	7	7,7
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**700**	**-**	**100**

The significance of the rank or priority order as listed in Table 6.35 is that this represents the joint opinion of all respondents across all sectors and secondly represents the level to which respondents regarded exposure to other sectors to be important. The table demonstrates therefore the percentage of commonality that individual sectors believed should be considered in curriculum development. The Landscape (20,4%), Turf (19,1%), Nursery production (15,4%) and Arboriculture (14,8%) sectors were seen as the most

important sectors that respondents from all sectors would want to have students exposed to. Amenity horticulture (11,8%), Floriculture (10,8%) and Nursery retail (7,7%) were regarded as the least important in terms of this exposure. In practical terms this means that in any curriculum, provision of between 30% and 70% should be made for the specific sector and the balance should be allocated to broader exposure.

This relevance of the above is that the degree of exposure that students should receive beyond that of their particular sector has been identified. The means of exposure or learning, whether by various modules and specialised subjects, will have to be determined by the curriculum writer.

In the paragraph that follows, the response to the division of responsibilities that a horticulturist may expect to experience after being qualified for more than two years, is discussed.

6.4.5 Division of responsibilities

Respondents were asked to presume that a horticulturist had been qualified for two, five and 10 years in their particular sector and then to indicate a sub-division of their responsibilities (in percentages) under horticultural, management/administrative and other. No distinction was made between sectors. This question has particular reference to an understanding of the type of responsibilities that an entrant into the industry may expect to encounter. These would normally be of a functional or horticultural nature in the first few years of employment, but would increasingly become more managerial/administrative as the individual was given greater seniority. The recognition by new entrants and of their mentors of the likely changes in responsibilities has implications for their progression in their careers. Technikon staff responsible for horticultural training should also assist entrants to make the change in focus, as an individual who is unprepared for the change may be unable to adapt to new circumstances.

The response to this question relates to a broad and general division of responsibilities across all sectors into the three identified forms of responsibilities of horticultural, managerial/ administrative and other. The number of respondents to this question was 170 (N).

Table 6.36 indicates that during at least the first five years horticulturists spend between 60% to 70% of their time on horticulturally (technical) related responsibilities as opposed to 25% to 35% on managerial/administrative responsibilities. It is after 10 years of

experience in the field that this ratio changes to 92,1% managerial/administrative and 6,9% horticultural. This data indicates that horticulturists move into managerial positions after between 5-10 years. Their curriculum should reflect this tendency and should prepare them for the responsibilities they will encounter. Alternatively, horticulturists should prepare themselves to undertake further studies after completing their initial qualification, in which case they would need to be informed of likely change in the nature of their responsibilities. Responsibilities listed under "other" included teaching, training and research, but as these percentages were all less than 2,4%, they are not significant.

TABLE 6.36: DIVISION OF RESPONSIBILITIES AFTER 2, 5 AND 10 YEARS EXPERIENCE (N 170)

Division of responsibilities	After 2 years	After 5 years	After 10 years
Horticultural	62,6	72,3	6,9
Managerial/administrative	35,0	25,4	92,1
Other	2,4	2,3	1,0
TOTAL	**100,0**	**100,0**	**100,0**

The importance of identifying the change in responsibilities for an entrant into the industry from horticultural to managerial/administrative is relevant to an acknowledgment of the change in skills/competencies that will be required of the individual.

The final two questions in the mail questionnaire offered respondents the opportunity to add any suggestions pertaining to the training of horticulturists as well as any general concluding comments.

6.4.6 Suggestions offered by respondents

As is standard practice in questionnaire surveys, respondents were asked to make any other suggestions (see Question 13, Table 3.4). This paragraph addresses those suggestions specifically related to the training of horticulturists. As was experienced with participants of the focus group interviews, respondents in general often see this as an opportunity to stress the issues that they may consider to be the most important. This was again the researcher's experience and special note has been taken of these comments.

Respondents from the Nursery retail sector listed no suggestions. The most salient suggestions warrant discussion and these were:

6.4.6.1 Amenity horticulture

A total of 19 respondents took the opportunity to make suggestions. The following aspects were listed as important in any management curriculum: computer literacy, people skills, leadership skills, labour relations, labour legislation, accountancy, meeting procedures and public liaison. Most respondents mentioned at least one aspect of management. Of particular note was the point that amenity horticulturists increasingly have to work in a private sector milieu and that management should have a business emphasis. Environmental management was seen to be increasing in importance, as were contracts management, machinery maintenance, park maintenance, irrigation and arboriculture.

One respondent stated that there was no sense in retaining the present three diplomas and that "...thorough research was needed to consolidate them into one study direction that responds to the needs of industry". Compulsory registration under a professional body as a student horticulturist was mentioned. Practical training was seen as very important. Several other suggestions were made relative to curriculum composition, e.g. "...a person just qualifying should be able to start his own business..." and "...the basic horticulture course should be called the ND in Horticultural Management, with specialisations on the BTech level and the curriculum should be designed to allow for specific directions".

6.4.6.2 Arboriculture

Only four respondents within this sector responded to the request for suggestions and/or other comments. Respondents stated that training in Arboriculture is an ongoing process, that Technikon training provides a grounding only and that training must be kept up to date and based upon the latest techniques. One respondent stated that all horticulturists irrespective of their chosen sector should be given a firm grounding in Arboriculture. It was also stated that all arborists should "...have the passion and the desire for nature and try and enhance the environment".

6.4.6.3 Floriculture

Only five respondents used the opportunity to comment in the spaces provided. Respondents warn of the commitment in time and energy in going into this sector, where a practical application is essential in a very intensive, volatile and a money-centred industry.

6.4.6.4 Landscape

A total of 15 respondents made a broad range of suggestions to this question. These appear to have an emphasis on the need for more practical training and on the need for managerial training. Three respondents made reference to the need to expose students to all aspects of the horticulture industry. The following comment probably applies to all sectors of the industry: "It is up to the student to nurture a love for plants and a willingness to learn plant names. If a student lacks this desire, he/she won't get far in horticulture."

6.4.6.5 Nursery production

A total of 12 respondents made a broad range of suggestions. Several of these had reference to the curriculum for this sector, e.g. "more hands-on experience, how soil pH affects certain plants", importance of indigenous plants in our local environment, labour law and propagation. While respondents were clear on the importance of skills/competencies in their sector, more than one respondent referred to the importance of a general background (gives students greater employment opportunities and a broader background). One respondent felt that graduates need more encouragement and training in lateral thinking and in creativity. Furthermore, that management and business skills are "sorely lacking among fresh graduates". The importance of developing a continuous learning philosophy was mentioned. It was felt that training should be more intense and fulfilling to the student, and that one cannot expect them to "know it all upon graduation".

6.4.6.6 Turf

Respondents (7) stated that honesty, reliability, motivation, life skills, free thinking, debate and an "ambition to do things well" are important in the development of horticulturists for the Turf sector. One respondent stated that "The principles of OBE training mitigate against the development of individualistic styles and leadership skills and promote group thinking". Irrigation, communication, equipment use and maintenance were specifically mentioned as areas of deficiency.

6.4.7 Other comments

The final question in the questionnaire offered respondents the opportunity to make any other comments they liked (see Question 14, Table 3.4). Respondents of the Nursery retail sector made no other comments. The following are the most salient comments and are listed below in their particular sectors:

6.4.7.1 Amenity horticulture

A total of 11 points of other comment were made. These varied from reference to the length of time he/she took to complete the questionnaire (2,5 hours) to a plea that the standard of training be maintained at a high level. The last-mentioned comment related to a concern the respondent had that service delivery to communities would be negatively affected. Further comments were made concerning the generalised nature of a horticulture course. Specialisation should not be brought into the course until at least the third or fourth year level.

6.4.7.2 Landscape

A total of 15 respondents from the Landscape sector responded to the opportunity to make other comments. As above, respondents (5) were clear in their request that students be allowed to generalise across all sectors, before specialising in the Landscape sector. One respondent put it aptly as "...the learner should undergo generalist studies for at least two years, after which he/she should start moving into the field in which he/she would like to specialise". An emphasis on the practical aspects of the course was again stressed, as were the managerial components. The latter had reference particularly to business and entrepreneurial skills.

6.4.7.3 Nursery production

Only five respondents made a few general comments. The point was again made here that students should be exposed to the full industry in their first two years and that they be allowed to specialise in their third and fourth years. Another respondent felt that students "...want to manage most of the time and not get dirty". Practical, hands-on experience is seen as vital. A professional approach to marketing in Nursery production was also seen as vital to this sector.

6.4.7.4 Turf

The same respondent who listed communication skills above, stated that students should be exposed to public speaking, for instance at garden clubs or schools. Students should also be exposed to different operating procedures; i.e. with varied financial budgets, ranging from racecourses, bowling greens to commercial arboriculture.

The mail survey's open-ended request for suggestions and comments has enabled respondents to place in writing their suggestions and opinions. This opportunity was regarded as essential as apart from the self-administered questionnaire, respondents had no personal contact with the researcher. The focus group participants, on the other hand, had ample opportunity at the interviews to raise any other issues that they felt were important. A variety of issues have been raised in the foregoing paragraphs and serious note should be taken of each.

6.5 SUMMARY

This chapter has aimed at presenting the results of the mail survey and this paragraph will highlight the key findings.

The general and biographical questions were aimed at analysing the respondent's sector, his/her employment in the sector and in the industry as well as his/her personal qualifications and experience. The Landscape sector was the most represented sector in the survey, though responses indicate that most horticulturists are employed in the Nursery production sector. Topics or areas of in-service training provided by companies/institutions represented by respondents were identified and most highly ranked of these were communication, labour and related aspects, machinery/equipment and interpersonal skills. The highest number of qualifications amongst respondents was found to be in the Amenity horticulture sector. The Arboriculture respondents had an average of 32,9 years of experience since being qualified. This was the highest across all sectors. Most respondents had been exposed to more than one sector during their careers. The Turf and Amenity horticulture sectors were the best represented in the total number of years of exposure to these sectors (15,2 years and 15,1 years respectively). Most respondents had gained their experience while working for a state-controlled institution. The private sector was most represented by the Nursery production sector and the state sector by respondents from the Amenity horticulture sector. The ratio of horticultural responsibilities as opposed to managerial/administrative was in favour of the latter with 56%. Respondents were asked to identify appropriate names for horticulturists working in their sectors and a broad range has been listed.

The second part of the questionnaire asked respondents five questions relative to curriculum development and the identification of skills/competencies. In the first question respondents were provided with an adapted list of fields of learning for each sector identified earlier by the focus group participants. Respondents rated the different fields of

learning for each sector in terms of exposure (time) they considered should be spent on each field of learning. Respondents also evaluated on a 5 point-Likert scale the level of preparedness of graduates. The responses to both of these varied between sectors, however technical (i.e. horticultural) skills and managerial skills were generally regarded as important, yet often graduates were less than well prepared in these. Using all of the research data that indicated the importance of the fields of learning as well as that which indicated the deficiences in current programmes and the summary of exposure time to each field of learning, a table that categorised the importance of all fields of learning was presented. This placed an evaluation upon each field of learning within each sector.

A concept curriculum framework was presented that was based upon the importance rating referred to above, but that used SAQA's credits to pinpoint the weighting of each field of learning in its specific sector. This was constructed so that a total credit rating of 360 credits was allocated to each sector, which represented a three-year full-time qualification. Respondents also identified a range of specific skills for each field of learning. These are listed in full in Appendices 6.1 to 6.7.

Respondents were provided with a list of attributes which employers could expect to find in a horticulturist entering their employment. The focus group participants had identified these and respondents to the mail survey were asked to rate on a 5-point Likert scale the degree of importance of each as well as the level of achievement of each. The latter related to how well horticulturists were seen to be achieving the attributes of for example, interpersonal skills. The attribute with the highest mean importance was integrity (honesty, sincerity, work ethics) followed by commitment (responsibility, dedication, being hardworking, accuracy) and a willingness to learn (also ability). All attributes were given high rankings of importance. The two attributes ranked the highest for achievement were integrity and a passion for plants and the environment. The importance and achievement means for all attributes were placed on an Importance-Performance Analysis graph so that a composite picture was obtained which clearly shows which attributes are important and which are being achieved.

Respondents were asked to allocate the exposure (time) a student studying for a career in their sector should be exposed to in all other sectors. The Landscape, Turf, Nursery production and Arboriculture sectors were seen as the most important general sectors in this regard. The relationship between horticultural and managerial responsibilities was regarded as an important one, especially where graduates have been working for a

number of years. Respondents were asked to indicate the relationship between those responsibilities and other after two, five and 10 years. Analysis indicates that horticulturists spend most of their time on horticultural responsibilities in their first five years, but then after that their managerial responsibilities increase up to more than 90% after 10 years.

Respondents were also asked to make any concluding comments and/or suggestions. Most respondents obliged and many additional comments of a varied nature have been included.

The sequential undertaking of personal interviews, focus group interviews and a mail questionnaire survey was specifically directed at an in-depth situational analysis of technikon horticultural training in South Africa. The mail survey was undertaken as a follow-up to the former two qualitative research techniques and served to generalise the findings of these techniques by broadening the universe to a national level. The mail survey used a quantitative approach and was able to validate part of the earlier findings and extend the complexity of those questions that were not fully covered. In this chapter the research results obtained from the mail survey have been presented and their relevance to the study has been explained. These results have described the horticulture industry, in which sector problems and challenges were identified, challenges of the future acknowledged, fields of learning studied in terms of their importance, the preparedness of graduates and the specific skills that comprise these core skills/competencies and other issues of importance evaluated. The mail survey has enabled the researcher to undertake the primary aim of the study, i.e. a situational analysis of the horticulture industry as well as most of the secondary aims. The latter refer to those aspects mentioned above that describe the horticulture industry and all of which have a bearing upon the design of a curriculum for horticulture. The concept curriculum framework is presented as a theoretical point of departure, which the industry will need to evaluate and consider for implementation at technikons.

The following chapter will present the conclusions to the research study as well as the recommendations.

CHAPTER SEVEN

CONCLUDING PERSPECTIVES

7.1 SUMMARY

A synopsis of the current position in curriculum development in horticulture education and training at technikons in South Africa was given in the first chapter. This included an historical overview of the development of the National Diploma programmes in Horticulture, Landscape Technology and Open Space and Recreation Management, which included three curricula revisions in 1979, 1991 and 1996. The process that has traditionally been followed in curriculum revision, which has included the Technikon movement's convenor technikons and advisory committees, was evaluated with specific reference to programmes in horticulture. The lack of empirical research in undertaking curriculum (re)design was discussed as a shortcoming in this process.

The importance of ensuring that the training of horticulturists for the green industries was maintained at a high level was stressed. As a result of the diversity that exists within horticulture, horticulturists are finding themselves in need of a broad range of both horticultural and managerial skills and competencies. The periodic changes to the horticulture curricula have made it particularly difficult for employers and the general public to keep pace with the skills and competencies taught to a horticulturist. In curriculum revisions of the past, which have been mainly content or subject-based, scant consideration has been given to the skills or competencies that may be required of a qualified horticulturist. One of the most serious deficiencies has been that the process has not included a needs or situational analysis.

The urgency of developing a revised curriculum that is acceptable to the different sectors of the industry has been indicated at various forums. The institution of OBE in South Africa and the registration of all recognised qualifications on the NQF has provided the horticulture industry with an ideal opportunity to revise current curricula in terms of the learning outcomes that qualifying learners will be expected to be able to demonstrate.

This study has been based upon the proposition that a scientifically validated situational analysis is an essential precursor to the development of a curriculum for tertiary-level horticultural training that addresses the requirements of the different sectors of the horticulture industry.

The subdivision of the horticulture industry in South Africa into sectors according to various professional and market factors was explained and the reason for selecting the following division in this research was motivated:

Amenity horticulture
Arboriculture
Floriculture
Landscape
Nursery production
Nursery retail
Turf

The **primary** aim of this study has been the undertaking of a situational analysis as the first phase of curriculum design. The results of this analysis will be utilised in the development of a theoretical curriculum framework that may be used in the development of a revised curriculum for technikon horticultural training, which meets the needs of the different sectors of the industry and which is structured in a format compatible with the NQF.

The **secondary** aims that were set for the study were:

- The identification of the primary, present and anticipated future competencies or outcomes (exit level outcomes and specified outcomes) of tertiary qualifications in horticulture at technikons (specifically including the identification of managerial competencies)
- The identification of the degree to which horticulturists have prepared themselves for their careers
- The identification of the optimum training opportunities or platform for the instilling of critical cross-field outcomes (or life skills)

- The identification of the most important attributes or qualities employers expect of a qualified horticulturist
- The identification of important values applicable to the horticulture profession
- The identification of criteria that could be used in selecting candidates for a programme in horticulture
- The identification of the changes that have taken place in the industry in the last 10 years and those that are anticipated for the next five years
- The identification of the most important problems and challenges currently being experienced in the seven sectors of the horticulture industry

Various related theoretical aspects of curriculum development were discussed in the second chapter, specifically as these relate to horticulture curricula. The objective in this was to contextualise the envisaged situational analysis within the process of curriculum development at technikons. Curriculum and curriculum development were defined and the four-phase process of curriculum development that includes design, dissemination, implementation and evaluation was discussed. The focus of this research on one of the sub-phases of curriculum design, i.e. situational analysis, was described and the process of undertaking a situational analysis was presented as the first step in curriculum design. The need for horticulture curricula to follow a process approach, a deep learning approach and a directed curriculum approach was motivated. Curriculum development in OBET and in particular the NQF and other SAQA structures and processes were discussed. The advantages and various criticisms of OBET in South Africa were highlighted, particularly as these affect technikon education. The process recommended by the CTP Working Group for technikon curriculum revision prior to SAQA's interim registration on 30 June 2000 was explained as was the current (September 2002) process being followed in gaining full registration on the NQF by 30 June 2006.

The third chapter sought in the first instance to motivate why this research study is both exploratory and descriptive and also why it uses a dual-approach that is quantitative as well as qualitative. The application of exploratory research to curriculum development in horticulture was considered relevant because little documentation exists regarding the specific skills and competencies being applied by horticulturists within the different sectors

and an investigative approach was therefore required. As the study describes the characteristics of horticulture education and training within the seven identified sectors and tries to understand the meaning and relevance of the data gathered, it may also be defined as descriptive. The study has been applied to an analysis of the curriculum development needs in the horticulture industry and may therefore also be defined as an applied research study. In this, it hopes to identify new knowledge that may be used to solve real-life problems.

The characteristics as well as the advantages and disadvantages of both the quantitative and the qualitative approaches were explained, while the use of a triangulation approach was discussed as a method that would enable the researcher to transcend the quantitative-qualitative divide. Its use in improving the generalisability of the findings and the validity and the reliability of the research techniques was also motivated.

In discussing the three research techniques selected for this study, both the position of each relative to the quantitative-qualitative dichotomy and the application of each to the research problem were explained. The personal interviews were used as a pre-test or trial survey to clarify the research problem and to identify critical key areas to be included in the ensuing stages of the research. The two qualitative methods, viz. the personal interviews and the focus group interviews, enabled the researcher to delve into the deeper issues under study. This was noted as one of the more important advantages of a qualitative approach. The mail survey, which utilised self-administered questionnaires, was used to generalise the findings of the qualitative methods to a national level and to collect empirical data that would be used to corroborate or to disprove the qualitative findings. The measures taken to ensure the validity and the reliability of the techniques used and the objectivity of the researcher were substantiated in the discussion of the three techniques.

The following paragraphs will present the findings of the study.

7.2 FINDINGS OF THE STUDY

The findings listed below are indicated according to the aspects or topics addressed in the research.

7.2.1 Context of horticulture curriculum development at technikons

- The process of establishing the necessary structures, which will facilitate the institution by SAQA of OBET, has not yet reached finality. Recurring changes to the SAQA structures and processes make curriculum development difficult, also within technikons. The process of curriculum development at technikons is currently in a state of flux as a result *inter alia* of the expected release of the NAP document and the NQF Study Team Review at the end of October 2002. This has meant that the CTP Curriculum Workgroup Co-ordinators have had to postpone their decisions on the process to be followed by technikons in registering their qualifications. The present deadline for full registration of qualifications with SAQA is June 2006.

- The current procedure in curriculum development at technikons whereby consultations are held with representatives from the respective industries, primarily through advisory committees, is regarded as inadequate. The importance of undertaking a situational assessment as the first step in curriculum (re)design has been clearly indicated in recent literature. This should also be subjected to the rigours of the scientific method.

7.2.2 Problems addressed in this research

The following findings are made from this study:

7.2.2.1 Core or overall skills/ competencies (i.e. fields of learning)

The following core or overall skills/competencies, listed in the two categories of horticultural and managerial and listed in order of importance were identified by means of the personal interviews:

Horticultural

Plant propagation
Plant knowledge
Using growth media
Irrigation systems

Utilisation of plants
Maintenance of plants
Plant protection
Environmental management
Horticultural tools, equipment and machinery
Plant sales

Managerial
Communication
Computer literacy
Financial management
Organisational
Supervisory
Labour relations
Human resource management
Planning/scheduling

- The skills/competencies identified above are not sector-specific and it is important to note therefore that these represent those of a general horticulturist. This study indicates that the latter should be seen as an individual with a variety of plant growth, plant use, plant maintenance skills/competencies as well as a range of general management skills/ competencies.

The following fields of learning were established for each sector by the focus group interviews and have been listed in order of importance:

Amenity horticulture
Management
Horticultural skills
Plant knowledge
Communication
Environmental management/conservation
Landscape

Community recreation
Contract/project management
Community development
Turf management
Urban/spatial planning

Arboriculture

Arboricultural skills
Management
Education/training
Environmental
Arboriculture and the law

Floriculture

Plant knowledge
Management
Soil science
Economics and marketing
Pest, weed and disease management
Harvesting and post-harvesting
Technical knowledge
Communication skills

Landscape

Horticultural skills
Management
Landscape construction
Landscape design
Communication
Logistics/equipment
Irrigation
Human resources management
Maintenance

Nursery production

Management

Propagation

Cultivation/growing skills

Plant knowledge

Marketing

Pest, weed and disease management

Communication

Nursery development and maintenance

Irrigation systems

Nursery retail

Plant knowledge

Retailing

Management

Plant protection

Communication

Soil science

Environmental

Landscape

Marketing

Plant management

Turf

Management

Agronomy/horticulture

Irrigation

Pest, weed and disease control

Environmental management

Soil science

Mechanisation

Construction of sports fields

Primary cultural practices
Secondary cultural practices

- The 10 most important fields of learning were found to be Management, Plant knowledge, Horticulture, Communication, Plant protection, Environmental management, Arboriculture, Soil science, Landscape construction and Irrigation. Plant knowledge, Plant protection, Environmental management, Management and Communication were found to be common to four or more sectors. Harvesting and post-harvesting, Technical knowledge (Floriculture), Contracts management and Community recreation were found to be least important across sectors because each one is largely specific to its sector. A ratio of 62,7 to 37,7 between the horticultural and managerial clusters was indicated.

The mail survey found that the following fields of learning were important to each sector (ratio of importance is indicated adjacent to each):

Amenity horticulture

Horticulture	28,7%
Management	24,1%
Landscape	20,0%
Environmental management	13,0%
Community recreation	11,4%
Other	2,8%

Arboriculture

Arboricultural skills	28,9%
Management	22,8%
Environmental management	15,6%
Education/training	15,3%
Arboriculture and the law	15,3%
Other	2,1%

Floriculture

Plant knowledge	23,9%

Pest, weed and disease management	19,1%
Management	14,3%
Communication	11,7%
Harvesting and post-harvesting	11,3%
Economics and marketing	10,3%
Technical/equipment/structures	9,3%
Other	0,1%

Landscape

Horticulture	20,2%
Landscape construction	17,5%
Landscape design	17,4%
Management	13,2%
Communication	10,9%
Irrigation	10,9%
Equipment (logistics)	8,8%
Other	1,1%

Nursery production

Cultivation/growing	15,5%
Plant knowledge	12,5%
Management	12,4%
Propagation	11,7%
Pest, weed and disease management	10,6%
Nursery development and maintenance	10,3%
Irrigation	9,8%
Communication	8,5%
Marketing	7,8%
Other	0,9%

Nursery retail

Plant knowledge	23,5%
Management	13,7%

Communication	13,4%
Pest, weed and disease management	12,2%
Retailing	11,1%
Landscape	10,4%
Environmental management	8,7%
Soil science	6,7%
Other	0,3%

Turf

Irrigation	15,6%
Pest, weed and disease management	15,2%
Management	14,9%
Construction	12,9%
Agronomy/cultural practices	12,2%
Mechanization	10,7%
Soil science	9,2%
Environmental management	8,4%
Other	0,9%

- It was found that the most important fields of learning across all sectors in the horticulture cluster were Plant knowledge, Pest, weed and disease management, Horticulture, Environmental management, Irrigation, Landscape and Arboricultural skills. The most important fields of learning in the managerial cluster were Management, Communication, Economics and marketing and Education and training. The ratio of horticultural to managerial fields of learning was found to be 65,8% to 33,0% (and other 1,2%), which is similar to that indicated by the focus groups.

- The identification of a range of fields of learning for each sector is an important finding in this study, especially as the relative importance of each field of learning to its sector has also been identified.

7.2.2.2 Cross-referencing importance of fields of learning and preparedness of graduates

A summary of the importance of each sector's fields of learning, as well as the level of preparedness of graduates, was presented as a tabulated summation that could be used to guide the revision of existing curricula. A categorisation of a total of 18 consolidated fields of learning was presented in Table 6.25, in which the importance of each to its specific sector was indicated on a three-point scale, i.e. moderate importance, considerable importance and essential importance. This table represents a list by sector of all of the consolidated fields of learning and indicates which fields of learning are at least moderately important.

It was found that:

- The Plant knowledge, Pest, weed and disease management, Horticulture, Management, Communication and Education and training fields of learning were indicated as more than considerably important to all sectors. Irrigation, Arboriculture, Landscape, Mechanisation, Turf culture, Floriculture, Specialised propagation, Economics and marketing, Retailing, Arboriculture and the law and Community recreation were indicated as more than considerably important to particular sectors.

- An unequal distribution of importance between the different sectors in the importance of the horticulture and management clusters was indicated. The horticulture cluster is seen as most important to the Turf, Landscape and Nursery production sectors and the management cluster is most important to the Nursery retail and Amenity horticulture sectors.

- Where a field of learning has not been indicated as at least moderately important to a specific sector, this is not seen to indicate its exclusion from an envisaged curriculum, but rather its significance as less than moderately important. A number of fields of learning were indicated as less than moderately important to certain sectors, e.g. Retailing is only significant to Floriculture (considerable importance) and to Nursery retail (essential importance).

7.2.2.3 Relationship between sectors in terms of exposure to other sectors in curriculum development

The identification of the extent of the need for horticulturists to be either specialists or generalists was gained by asking respondents in the mail survey to consider, in preparing a course of study, how they would subdivide a student's time (or exposure) between their specific sectors and all other sectors.

- It was found that respondents allocated the highest percentage exposure to their sector, but high allocations were also made to what could be considered complementary sectors (e.g. Turf and Landscape). Low allocations were made to sectors with little in common with the respondent's sector. The Landscape, Turf, Nursery production and Arboriculture sectors were seen as the most important sectors and Amenity horticulture, Floriculture and Nursery retail were regarded as the least important in terms of this exposure. A maximum provision of 70% should be made for the specific sector, while the balance may be allocated to broader exposure.

7.2.2.4 Allocation of credits to fields of learning per sector in a concept curriculum framework

The presentation in Table 6.26 of a concept curriculum framework for each of the seven sectors was based primarily upon the identification of the relative importance of the fields of learning as indicated in Table 6.25 and upon the researcher's allocation of SAQA credits to each field of learning. Use was made of SAQA's definition of a credit as equaling 10 notional learning hours and three years of full-time study equalling 360 credits.

- It was found that the concept *curriculum framework* presents a fair reflection of the weighting that could be placed upon the fields of learning within each sector. Furthermore, the framework has facilitated the writing of outcomes both specific to each sector and generic across sectors. An analysis of the comprehensive listings of the specific skills/competencies identified in the study will provide the substance for this.

7.2.2.5 Specific skills/competencies within each field of learning

It was found that when respondents in both the focus group interviews and the mail survey were requested to list the important specific skills/competencies within each field of learning, a broad response was received. All responses have been listed under the specific fields of learning for each sector. Appendix 5.1 represents the specific skills/competencies identified by the focus groups and Appendices 6.2 to 6.8 those identified by the mail survey. These should be read in combination so that a fuller representation is obtained.

7.2.2.6 Division of responsibilities

In identifying a division of a horticulturist's responsibilities between those that are horticultural, managerial/administrative and other, where a horticulturist had been qualified for two, five and 10 years, the following was found:

- During at least the first five years horticulturists spend between 60% to 70% of their time on horticulturally (technical) related responsibilities as opposed to 25% to 35% on managerial/administrative responsibilities. After 10 years of experience in the field this ratio changes to 92,1% managerial/administrative and 6,9% horticultural, which indicates that horticulturists move into managerial positions at between 5-10 years.

7.2.2.7 Skills/competencies adequately and inadequately provided for

- It was found that the respondents felt that students are adequately trained in the horticultural aspects of their jobs, yet their managerial training is inadequate and is largely taken for granted as something one imbibes by exposure to the workplace.

- Respondents found that in the Managerial, Communication, Economics and Marketing, Environmental management, Irrigation, Soil science, Technical/equipment/structures and Pest, weed and disease management fields of learning, graduates in two or more sectors were generally less than poorly prepared.

- It was also found that the graduates were more than well prepared for the following fields of learning (sectors listed in brackets):

  Cultivation/growing (Nursery production)
  Education/training (Arboriculture)
  Horticulture (Amenity horticulture, Landscape)
  Landscape (Amenity horticulture)
  Landscape construction (Landscape)
  Landscape design (Landscape)
  Mechanisation (Turf)
  Nursery development and maintenance (Nursery production)
  Pest, weed and disease management (Floriculture, Nursery production, Nursery retail, Turf)
  Plant knowledge (Floriculture, Nursery production, Nursery retail)
  Propagation (Nursery production)
  Soil science (Turf)

7.2.2.8 Aspects of the job with which horticulturists struggle

- The research identified the following 20 different categories of skills or aspects of the job that horticulturists were seen to struggle with (listed in priority sequence):

  Managerial
  Financial
  Interpersonal
  Communication
  Plant utilisation
  Labour relations
  Landscaping
  Computer literacy
  Practical application
  Problem-solving
  Mechanical

Pests and disease control
Commitment
Self confidence
Irrigation
Marketing
Environmental
Recreation
Soil science
Arboricultural

- When this list was further divided into those aspects of a horticultural, managerial and personal nature, it was found that the skills with the highest rank order that horticulturists struggle with are those of a managerial nature, followed by horticultural skills and lastly by those of a personal nature.

7.2.2.9 Background knowledge required

- The study found that the following 10 subject areas represent an appropriate background for candidates entering into a course in horticulture (listed in rank order):

Botany/biology
Physics/chemistry
Ecology/geography
Communication
Management
Business economics
Mathematics
Computer literacy
Art/technical drawing
Mechanical

- This listing indicates that the scientific aspects of horticulture are important in understanding the essence of horticulture. These are prominent in this list, as are managerial and communication subjects.

7.2.2.10 Incorporation of critical outcomes into curriculum

- The ideal location for the learning of SAQA's critical outcomes was considered best placed on campus as well as in the workplace during the student's period of experiential learning. This was seen as a joint responsibility where the aim should always be to replicate real-life situations.

7.2.2.11 Attributes or qualities employers expect of a qualified horticulturist

- The study found that the following rank-ordered list was representative of the most important attributes or qualities which employers regard as important to the employment of horticulturists (indicated in brackets are those attributes or qualities which are closely aligned to the first mentioned):

Integrity (honesty, sincerity, work ethics)
Commitment (responsibility, dedication, being hardworking, accuracy)
Willingness to learn and ability
Initiative (being a self-starter, self-motivation)
Interpersonal relations (people skills, staff and clients)
Management skills (also planning and organising)
Passion for plants and the environment
Problem-solving (also practical application)
Personal growth, development and confidence
Creativity (lateral thinking, innovation)
Plant management and technical skills
Leadership skills
Business skills (also professionalism)
Communication and computer literacy

A second aspect related to the above aimed at determining how well horticulturists were achieving these attributes. The following was identified:

- Integrity and a passion for plants and the environment were ranked the highest for achievement, while business skills and communication and computer literacy were ranked the lowest in achievement.
- The graphic presentation on an Importance-Performance Analysis graph indicated considerable disparity between the ratings for importance and those for achievement.

7.2.2.12 Values applicable to the horticultural profession

- The study found that the following cardinal values are important in laying the foundation for a professional ethic. These are rank-listed below within the four clusters of values of Greening, Environmental, Professionalism and Managerial:

GREENING

Urban greening and beautification
Affinity for plants
Use of indigenous plants
Sustainability in landscapes
Provision of recreational amenities
Creativity in designs

ENVIRONMENTAL

Environmentally friendly approach
Conservation of water/being water-wise
Conservation of resources
Environmental education
Eradication of aliens

PROFESSIONALISM

Promotion of horticulture

Cliet service ethic
Personal education
Personal values

MANAGERIAL
Expertise
Economic base

7.2.2.13 Problems and challenges in the horticultural industry

In the personal interviews, interviewees were asked to list any problems relative to the education and training of all levels of staff in the horticulture industry, while in the focus groups interviews, this was broadened to include the problems and challenges that the respondents foresaw as typical of their sector.

- The personal interviews identified the need to provide short-courses on managerial training, providing public sector training with restricted funding, lack of entrepreneurial skills, a greater emphasis needed on environmental sustainability and lower levels of staff in urgent need of training as important problems in the education and training of all levels of staff.

- The personal interviews indicated that the need to adapt to downturns in the economy, water restrictions, environmental pollution and general awareness, innovations in technology, resistance developed in virile pests and diseases, privatisation of municipal horticultural services, changes in labour legislation and fluctuating standards of quality were challenges facing the horticulture industry in the next 5-10 years.

- The focus group interviews found that a broad similarity of problems and challenges exists across sectors and that despite many operational differences, the seven sectors of the industry face many comparable problems. The interviews indicated that the Arboriculture, Floriculture, Landscape, Nursery production and Nursery retail sectors had many problems and challenges of a technical and/or professional nature. Issues of a labour context were mentioned by three sectors as one of their three major priorities. Managerial

issues and environmental issues were also listed by all sectors in one way or another. The difficulty of dealing with problem clients was mentioned by three sectors as a major problem.

7.2.2.14 Changes in the last 10 years and expected changes in the next five years

- The focus group interviews indicated that the changes that have taken place across the seven sectors of the horticulture industry, as well as those that are anticipated, are varied and to a large extent are sector specific.

- Respondents operating in the public sector felt that the biggest changes being experienced in their sectors have occurred as a result of financial stringencies. These have led to a lower level of service delivery, but also to the increasing use of maintenance-free landscapes, water-wise plants and a strong environmental focus.

- The Arboriculture sector expects that a great variety of regulations to protect urban trees will be legislated as a result of the emphasis being placed nationally upon the greening of urban environments.

- The Floriculture, Nursery production and Nursery retail sectors considered the marketing and export of their products to be the most important areas where change may be expected to occur.

- The Landscape sector expect that the current development of quality standards of delivery will lead to new demands in products and in service (e.g. water-wise landscapes, maintenance projects, rehabilitation projects).

- The change in the gardening market was highlighted by the nursery sectors where the demand by the public for nursery products is largely influenced by the economy and by changing fads. This sector expects the general importance being accorded to environmental issues to continue and to be reflected in the purchasing of indigenous plants, with the sale of annual plants diminishing drastically.

- The Nursery production sector regard fluctuating markets as an important phenomenon because investments are held up as growing stock requires several years to mature.

- The diversification in the Nursery retail sector was expected to continue into the future and retail nurseries would increasingly become lifestyle centres.

- The public's heightened expectations in the quality standards of sporting and recreational facilities was regarded by the Turf sector as a development that would continue to place increasing pressure on their operations.

7.2.2.15 The contextual framework for each sector

- It was found that the broad range of definitions offered by respondents as representing the contextual frameworks for each sector indicates that respondents are not all in agreement as to what their core business is. The most encompassing definitions were selected and these were found to be useful in determining the boundaries of the individual sectors.

7.2.2.16 In-service training provided

- The interviewees in the personal interviews stated that their companies/institutions provided some form of training, although this varied greatly and was not always offered at all levels. Many companies/institutions offered this in-house, particularly to lower levels, or had a training agency perform this function on senior levels. The municipal parks and recreation departments provided the broadest range of training opportunities. The private sector was found to provide very little training.

- Further clarity on the type and extent of training of in-service training programmes to horticulturists was gained from the mail survey. The most mentioned topics or areas of training were found to be communication, labour issues, machinery/equipment, interpersonal skills and managerial skills. A far greater need for managerial training as opposed to horticultural training was identified.

7.2.2.17 Appropriate names for horticulturists in different sectors

- In seeking to identify a uniform name for a horticulturist across the seven sectors, the study found that the name "horticulturist" is not used in all sectors. The importance of an own identity as well as a common name across sectors was regarded as important. A variety of names were listed for each sector.

7.2.2.18 Selection criteria for prospective students in Horticulture

- The study found that the following criteria were the most important in selecting an individual for a course in horticulture:

  Nature/outdoor emphasis
  Motivation
  Interpersonal/communication skills
  Broader interests
  Practical orientation
  Scholastic aptitude
  Creativity
  Physical fitness
  Leadership qualities
  Entrepreneurial
  Other

- In sum, the findings were that potential candidates should be dynamic, hardworking and have a love of the outdoors. They should demonstrate a love of plants and a desire to use them to beautify the environment. Versatility in applying themselves to varying situations was seen as important because the industry continually had to face many challenges.

7.2.2.19 Suggestions and other comments raised by respondents

- It was found from the varied response to this question that a diversity of issues exists relative to each sector. Note has been made of these and the issues have been incorporated into the findings, under the appropriate headings.

The primary aim of the research study was the undertaking of a situational analysis and the development of a theoretical curriculum framework and the recommendations that follow relate directly to these aims.

7.3 RECOMMENDATIONS REGARDING A THEORETICAL CURRICULUM FRAMEWORK

The recommendations that emanate from this research study have been listed below without further clarification as the findings have provided a contextual background to each of these. These recommendations are addressed directly to curriculum developers within technikons, tasked with curriculum development in horticulture programmes. This constitutes a concept curriculum framework for horticultural programmes at technikons and has been the primary aim of this research. The curriculum framework is seen as the culmination of the study and its central focus. It is supported, however, with a range of variables that relate directly to it, e.g. identification of sector-specific fields of learning, of their importance, of the preparedness of graduates in these and attributes and qualities that employers seek in a qualified horticulturist.

A full schedule of all of the recommendations that originate from the findings will be presented below.

7.3.1 Situational analysis as part of curriculum design

It is recommended that:

- The revision of curricula is undertaken on a continual basis as a direct result of the rapid rate of change that has been shown to take place in the horticulture industry. This revision

should incorporate an empirically based situational analysis as a fundamental step in the curriculum design process. Any major changes to curricula could then be instituted on a five-year cycle, with minor adaptations occurring annually.

- A triangulation approach to the situational analysis be applied, whereby both a quantitative and a qualitative approach are used. The application of personal interviews, focus group interviews and a mail survey are recommended as these research techniques are suited to situational analyses.

- Further research into curriculum development in horticulture utilises the seven sectors identified in this study, as this would heighten their comparability with the results from this study.

7.3.2 Allocation of credits to fields of learning per sector in a concept curriculum framework

It is recommended that:

- The concept curriculum framework presented for each of the seven sectors (see Table 6.26) and which was based upon the relative importance accorded each field of learning and upon the researcher's allocation of SAQA credits to each field of learning, be offered to the horticulture industry for evaluation.

- Outcomes, both specific to each sector and generic across sectors, be written based upon the curriculum framework. The specific skills/competencies identified in the study will provide the material for this.

- Once clarity has been gained on the implementation of level descriptors in Higher Education, the importance ratings allocated to fields of learning in this research are used to assist in the fixing of level descriptors.

7.3.3 Core skills/competencies (i.e. fields of learning) and specific skills/competencies

It is recommended that:

- The fields of learning identified by the study (as listed in Paragraph 7.2.2.1) for each sector be adopted as the point of departure in determining exit level outcomes for the development of programmes in each of the seven sectors.

- The fields of learning common to several sectors constitute a range of core or generic modules, which may be applied to all sectors. This range would allow each sector to select a particular set of modules that constitute the depth it deems necessary for its purposes.

- The fields of learning of Plant knowledge, Pest, weed and disease management, Horticulture, Management, Communication and Education and training fields of learning be incorporated to an advanced level in envisaged curricula as they had been identified as more than considerably important to all sectors. The fields of learning of Irrigation, Arboriculture, Landscape, Mechanisation, Turf culture, Floriculture, Specialised propagation, Economics and marketing, Retailing, Arboriculture and the law and Community recreation were also indicated as more than considerably important to particular sectors and their inclusion in the curricula to an appropriate level is recommended.

- Where a field of learning has not been indicated as at least moderately important to a specific sector, it is offered to candidates as at least an optional module. This would facilitate the development of a range of modules that represent sector-specific fields of learning that could be offered as electives in other sectors.

- In all sectors a ratio of approximately 60% to 40% in horticultural to managerial fields of learning be maintained in curriculum (re)design. It is of particular significance that after 10 years of experience in the field, responsibilities were found to change heavily in favour of managerial/administrative as opposed to horticultural.

- In planning the curriculum for a specific sector, provision of at least 30% be made for exposure to other sectors. High exposure in training should be given to what could be considered complementary sectors (e.g. Turf and Landscape). Only low exposure need be given to sectors with little in common. The Landscape, Turf, Nursery production and Arboriculture sectors were seen as the most important sectors in this respect and candidates in each of these should receive broad cross-sector exposure. Amenity horticulture, Floriculture and Nursery retail were regarded as somewhat specialised and it was felt that candidates did not need anything more than basic exposure.

- In the design of a curriculum for any specific sector, all listed specific skills/competencies be considered for inclusion under the respective fields of learning listed for that sector.

- The responsibility for teaching learners the critical outcomes identified by SAQA be accepted as a joint responsibility between the technikons and the employers who accept students for experiential training.

7.3.4 Skills/competencies adequately and inadequately provided for

It is recommended that:

- A high priority in curriculum revision be given to the Managerial, Communication, Economics and Marketing, Environmental management, Irrigation, Soil science, Technical/ equipment/structures and Pest, weed and disease management fields of learning as graduates were found to be poorly prepared for these.

- Those aspects within the managerial cluster of fields of learning that are regarded as problematic be given higher priority in the revision of curricula. Caution should be taken in not assuming that learners will "pick it up" along the way.

- Attention be given in all curricular activities to the skills or aspects of the job that recently qualified horticulturists were seen to struggle with (listed in priority order in Paragraph 7.2.2.8).

- The application of a deep-learning approach be utilized in teaching and learning as many of the deficiencies identified in this study could be overcome by an approach that compels students to resolve problems in a real-world context.
- The strengths in current programmes, where graduates were considered to be more than well prepared, be built upon and remain the strengths, also in revised programmes (see Paragraph 7.2.3.6).

7.3.5 Background required to acceptance of candidates into horticulture programmes

It is recommended that:

- The 10 subject areas identified in the study as representing an appropriate background for entrants into a course of study in horticulture (as listed in Paragraph 7.2.2.9) be included as far as possible in the secondary school curricula for those candidates planning a career in horticulture. The rank order of this list is an indication of the relative importance of each subject area.

- The criteria identified in the research as appropriate to the selection of prospective candidates applying to enroll in a course in horticulture be used in accepting these candidates and that guidance teachers at schools be informed of these criteria (see Paragraph 7.2.2.18).

7.3.6 Attributes or qualities employers expect of a qualified horticulturist

It is recommended that:

- Entrants into the horticultural industry take special note of the ranked order of the attributes or qualities that employers seek in an employee (see Paragraph 7.2.2.11) and that this be borne in mind in curriculum revision and in teaching and learning. It is also recommended that particular note be taken of SAQA's critical outcomes, as considerable overlap is evident between these two phenomena.

7.3.7 Values applicable to the horticulture profession

It is recommended that:

- In view of the significance of the Greening, Environmental, Professionalism and Managerial values identified as important to the horticulture profession (see Paragraph 7.2.2.12), they form the undertone of all curricular activity.

7.3.8 Problems and challenges in the horticulture industry

It is recommended that:

- The problems and challenges identified in the study that relate to matters of technikon education and training be addressed by the technikons together with their advisory committees. Furthermore, that curriculum writers focus on both sectoral and cross-sectoral problems and challenges. Educators are strongly encouraged to inculcate in their learners a problem-solving approach that would assist them in resolving the industry problems and challenges.

- The problems and challenges identified in the Arboriculture, Floriculture, Landscape, Nursery production and Nursery retail sectors, which were mostly of a technical and/or professional nature, be addressed by the various professional and industry bodies. Furthermore that a communal industry body address the labour, communication, public relations, managerial and environmental issues identified as common to all sectors.

7.3.9 Changes in the last 10 years and expected changes in the next five years

It is recommended that:

- Sector-specific professional bodies address the variety of changes identified as having occurred within different sectors in the last 10 years, as well as changes that are expected to take place in the next five years. The broader changes currently being experienced

relate to economic, marketing and financial issues, environmental issues and issues relating to demands in service delivery. Cross-sector bodies in the industry could best address these.

7.3.10 Contextual framework for each sector

It is recommended that:

- Curriculum writers use the contextual definitions of specific sectors identified in this study to delimit the boundaries of these sectors, as the functions and responsibilities of horticulturists operating in specific sectors would need to be clearly outlined if clarity is to be maintained in the development of curricula.

7.3.11 Appropriate names for horticulturists in different sectors

It is recommended that:

- The name "horticulturist" be actively promoted for an individual qualified in horticulture and working in any sector as this will provide the profession with a uniform identity and post incumbent with a name or title that has international recognition and prestige. It is furthermore recommended that a range of qualifying names that indicate which sector the horticulturist currently works in be used should they receive general recognition, e.g. Amenity Horticulturist, Landscape Horticulturist, Propagation Horticulturist, Retail Horticulturist and Turfgrass Horticulturist. The two names that do have their own identity are Arborist or Arboriculturist and Floriculturist.

7.3.12 In-service training provided

It is recommended that:

- As employers in the horticulture industry were found to provide differing types and levels of in-service training, the professional bodies take greater responsibility for the training within sectors and that employers take cognisance of the implications of the Skills

Development Act (Government Gazette) and their responsibilities in this regard. The far greater need identified for managerial training as opposed to horticultural training should be addressed.

7.3.13 Promotion of profession amongst general public

It is recommended that:

- The respective professional bodies embark upon an aggressive marketing drive to promote the profession in the eyes of the public as the study indicated that the general public is largely unaware of the training that horticulturists receive.

7.4 CONCLUSION

The primary aim of this study was stated as being the undertaking of a situational analysis as the first phase of curriculum design. The importance of undertaking a situational analysis was shown to lie in the fact that neither an empirically researched curriculum design or curriculum redesign has ever been undertaken in the development for programmes in horticulture. The opportunity posed at this time, with the institution of an OBE approach to education and training and the promulgation of the SAQA Act No. 58 of 1958, is that of determining as precisely as possible, what skills and/or competencies are incumbent upon a practitioner operating in any one of the sectors of the horticulture industry.

While this study undertook a situational analysis as its primary objective, the development of a theoretical curriculum framework is seen as the logical conclusion of this analysis. This was presented in the penultimate chapter and represents a synthesis of the most important findings of the study. Its presentation to the industry as a concept curriculum framework, upon which a revised curriculum for technikon horticultural training may be based, was recommended in this chapter. It was stipulated at the outset of this study that this framework should provide for the needs of the different sectors of the industry and be structured in a format compatible with the NQF.

The identification of core or overall skills/competencies (defined in the research as fields of learning) for each sector, together with an importance rating of each was an important secondary aim of the study. It is this that forms the structure that may be used for curriculum redesign. Many specific skills/competencies were also identified, which may be used to define the content of each field of learning. The fields of learning are easily translatable to SAQA's exit level outcomes and the specific skills to SAQA's specified outcomes. The identification of those that will be core, fundamental and elective to the curriculum for a specific sector has been eased because the importance of each field of learning to its sector has been ascertained. The importance rating given to each field of learning will also facilitate the determination of level descriptors.

The study also identified a range of other aspects, which directly relate to the education and training of horticulturists. The most important of these were the identification of those fields of learning for which graduates are seen to be inadequately prepared, and secondly what attributes or qualities employers expect a qualified horticulturist to have when he/she comes into their employment. Sector-specific problems and challenges were identified, which assist in the recognition of training needs, and selection criteria to be followed in accepting candidates into horticulture programmes were identified.

The opportunity afforded the researcher in undertaking this study was that of grappling with the sum and substance of education and training in horticulture, of interacting through the research with many industry members, past students and former colleagues and of being able to make a number of proposals, which may assist the industry in meeting the needs of this decade.

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APPENDIX 1.1

MINUTES OF MEETING HELD ON THE 9TH OF MARCH 1999

Minutes of meeting held on 9/3/1999 at Cape Technikon of joint Advisory Committees for Horticulture of Cape and Peninsula Technikons

1. PRESENT:

	Dr T Wood	-	Pentech (Facilitator)
	Prof M Welgemoed	-	Cape Technikon (Evaluator)
Messrs:	F du Toit	-	Acting Director, School of Life Sciences, Cape Technikon
	M H Young	-	Cape Technikon
	C Laubscher	-	Cape Technikon
	C Justus	-	Cape Technikon
	C Daniels	-	Cape Technikon
	B Theron	-	Cape Technikon
Me:	V Potterton	-	Cape Technikon
	L de Villiers	-	Cape Technikon
	S Levick	-	Cape Technikon
Messrs:	J C Coetzee	-	Peninsula Technikon
	G Dreyer	-	Peninsula Technikon
	R Falck	-	Peninsula Technikon
	J October	-	Peninsula Technikon
	R Jamieson	-	Cape Town City Council - Parks & Bathing Amenities
	M Brinkhuis	-	Agricultural Research Council
	E Cherry	-	SALI
	D Henderson	-	SANA
	M Faulhammer	-	Super Plants Nursery
	K Brüsseke	-	IERM / BTech Open Space & Recreation Management Student
	B Pederson	-	Starke Ayres Nursery / BTech Horticulture Student
	K Herman	-	ND Horticulture past student
	D van Eeden	-	Top Turf Landscaping
	P Theron	-	South Peninsula Municipality - Parks & Forests
Me:	C Dorfling	-	WP Technical College
	J Wouters	-	Marina Landscaping
	F Powrie	-	National Botanical Institute
	Z Soomar	-	SAFCOL / ARC
	R Knaggs	-	BTech Landscape Technology Student

2. APOLOGIES:

	Prof N Kok	-	Senior Vice Rector, Cape Technikon
Messrs:	P de la Hunt	-	IERM, Helderberg Municipality - Community Services
	R Horn	-	IERM (retired Cape Town City Council - Parks & Bathing Amenities)
	W Bayer	-	Shadowlands Nursery
	R Hawkins	-	ND Horticulture (past student)
	G Engelbrecht	-	University of Western Cape - Gardens Department
Me:	C Klein	-	UWC (E.E.R.U.)

3. WELCOME

Mr Frans du Toit welcomed all delegates to the meeting, the first of its kind between the Advisory Committees for Horticulture of the Cape and Peninsula Technikons. He stressed the importance of joint meetings of this nature between the educational providers and the industry members, particularly as the re-writing of curricula must be outcomes-based and must be done according to SAQA's requirements for the registration of qualifications on the NQF.

4. SAQA REQUIREMENTS

Dr Wood explained the philosophy behind an outcomes-based approach to education and training (should be seen as one), the requirements of SAQA (South African Qualifications Authority) and specifically the NQF (National Qualifications Framework). All qualifications must be registered by SAQA on the NQF and the Technikon movement would be registering "whole qualifications" (due date 30/6/2000). To be registered, these have to specify amongst others a mission statement, exit level outcomes, specified outcomes, critical outcomes and assessment criteria for each. We would be concentrating on the ND Horticulture and would try to establish a foundation (for the most common qualification in our field), from which we would be able to write the outcomes for the ND Landscape Technology, the ND Open Space & Recreation Management and also the Certificate, Higher Certificate, BTech, MTech and DTech for each direction.

The Diploma should presently be seen as being on Level 6, with 360 credits. (This could change in due course). While years of study were to fall away, each "year of study" would comprise 120 credits (or 1200 notional learning hours).

5. IDENTIFICATION OF SECTORS WITHIN THE HORTICULTURAL INDUSTRY

Mr Young asked everyone present to prepare a list of all the sectors they saw as existing with the horticultural industry. No discussion of this followed, though once collated, it should be evaluated at a further meeting (See Annexure A).

6. IDENTIFICATION OF A MISSION STATEMENT FOR THE ND HORTICULTURE

Dr Wood asked delegates to comment on the mission statement prepared by Mr Young (as an example), i.e. "The qualifying learner will have the competence to apply a range of horticultural technologies and management skills to the public and private sectors of the industry".

After some debate, the meeting resolved to accept the proposed mission statement, with reservations and to review it again after deciding on the exit level outcomes. Much of the debate revolved around the level of management skill a qualifying student should have.

7. IDENTIFICATION OF ELOs (EXIT LEVEL OUTCOMES)

Dr Wood asked the delegates to workshop in their groups the ELOs for the ND Horticulture, i.e. what outcomes or competencies did they regard as critical for a student completing a diploma in Horticulture. A maximum of seven ELOs should be identified. The six groups each had:

a) A technikon staff member with a horticultural background
b) A technikon student who had studied one of the three directions in the last 10 years
c) A member of the industry from one of the following varying backgrounds, viz:

- research
- greenkeeping
- parks and recreation
- commercial retail horticulture
- commercial production horticulture
- landscaping planning and construction
- commercial allied trade
- organised labour

Other expertise available amongst the members:

- Entomology
- Botany

The following professional bodies were represented:

- SANA - South African Nurserymans Association
- SALI - South African Landscape Institute
- WPTA - Western Province Turfgrass Association
- IERM Africa - Institute of Environment & Recreation Management
- WP Technical College
- National Botanical Institute
- Agricultural Research Council

The plenary session identified the following five ELOs:

1.	Apply appropriate plant production techniques.
2.	Utilise plant material.
3.	Maintain plants.
4.	Apply operational procedures.
5.	Commercial / professional.

(Note: 4 and 5 had originally been identified as "Apply basic management skills", but following a re-visit to the ELOs after doing the SOs, the 5 ELOs listed above were adopted).

8. IDENTIFICATION OF SPECIFIED OUTCOMES (SOs)

Following the consensus reached with the ELOs, Dr Wood requested the delegates divide into four random new groups, each group to prepare a maximum of 7 SOs for each of the ELOs. These are listed on the attached Annexure B together with each ELO. The general feeling seemed to be that more discussions were necessary regarding the SOs.

9. EVALUATION AND PROGRESS SUMMARY

In her evaluation of the progress of the day's activities, Prof Welgemoed congratulated all delegates on (virtually) finalising the purpose statement, the ELOs and the SOs. The next step would be to prepare the same for the other qualifications and also to prepare critical outcomes and assessment criteria for each specified outcome. She also thanked Dr Wood for his role as facilitator.

10. EVALUATION FEEDBACK

The following evaluation document was utilised to obtain each delegate's opinion on the day's proceedings. The evaluation questionnaires were summarised after the event and only the general consensus is given for each question:

EVALUATION OF PROCEEDINGS OF CURRICULATION MEETING 9/3/1999

Please answer all of the following questions as honestly and as fully as you are able. Please indicate whether you think ..... an aspect was

..... 1 = well dealt with
..... 2 = adequately dealt with
..... 3 = inadequately dealt with
..... 4 = unsure

(PLEASE EXPLAIN IF YOU ANSWER 3 OR 4)

1) Explanation of the SAQA requirements ☐ *1*

2) Identification of sectors of the Horticultural industry *2 (Need feedback)*
3) Development of a Purpose Statement for the ND Horticulture *2 (to be re-visited)*

4) Development of Exit Level Outcomes for the ND Horticulture *1*
5) Development of Specified Outcomes for the ND Horticulture *2 (need more time)*
6) Identification of ELOs and SOs for a) ND Landscape Technology *Not done*
b) ND Open Space & Rec. Man. *Not done*
7) Workshop process *1*
8) Logistical arrangements (incl. Refreshments) *1*

Please use the space below to indicate.

9) What you think should be done next in this process that you were involved with today?

Review and identification of outcomes for other qualifications.

10) Whether you would like to be involved again? YES / NO ..... In what capacity?.....

All delegates expressed a desire to be involved again, most in whatever capacity they were needed.

11) Any other comments you may have?.....

THANK YOU VERY MUCH!!!!!!!

11. RECORDING OF APPRECIATION

Mr Young thanked Dr Wood, Prof Welgemoed and all participants for their participation and help in making the exercise a fruitful one.

M H YOUNG
ASSOCIATE DIRECTOR: SCHOOL OF LIFE SCIENCES

ANNEXURE A

IDENTIFICATION OF SECTORS OF HORTICULTURAL INDUSTRY BY FUNCTION (MEETING 9/3/1999)

Commercial plant wholesale production	Marketing Bulbs Indoor plants Outdoor flowers Dried flowers Trees Shrubs and groundcovers Annuals Grass Vegetable and fruit trees
Commercial plant and allied retail	Marketing Garden centres, nurseries Seed and bulb suppliers Machinery Irrigation Drainage Artificial flowers / plants
Parks and recreation (incl. horticultural maintenance)	Urban space planning Municipal / state parks, gardens and sportfields Recreation services (municipal) NBI Private sector recreation and sport clubs Commercial recreation and sport clubs Arboriculture Garden maintenance Pest and weed management
Design and landscaping	Landscape architects, designers Landscape construction, hard and soft Interior scaping construction and maintenance Landscape maintenance
Environmental	Vegetation control Re-vegetation / hydroseeding Assessment / monitoring Pest and weed management
Commercial allied	Tools and machinery Irrigation design, installation and maintenance Agronomy and fertilisation requirements Related products (outdoor furn. etc)
Research, education and training	Universities, Technikons, Technical colleges Plant breeding NBI

	Plant propagation techniques Identification / herbarium Medical / food plants Pest identification and management
Turfgrass	Design Construction Maintenance Irrigation Pest and weed management
CommunityHorticulture	NBI Educational outreach Promotion Horticultural therapy
Consultancy	Landscape Pest management Agronomy (and fertilizers) Irrigation
Floristry	Decorations Floral marketing (incld. export) Wholesale

ANNEXURE B : EXIT LEVEL OUTCOMES AND SPECIFIED OUTCOMES FOR ND HORTICULTURE

Exit Level Outcomes	Specified Outcomes
1. Apply appropriate plant production techniques	1. Propagate plants sexually 2. Propagate plants asexually 3. Grow on plants 4. Prepare growth media 5. Utilise plant production structures 6. Harvest, market and despatch plant products
2. Utilise plant material	1. Identify plants 2. Select plants 3. Design with plants 4. Record site information
3. Maintain plants	1. Control pests and diseases 2. Feed plants 3. Test and utilise soils 4. Implement irrigation systems 5. Use horticultural machinery 6. Assess environmental conditions and impacts 7. Manipulate plant growth 8. Construct nurseries
4. Apply operational procedures	1. Control a budget 2. Plan activities 3. Monitor activities 4. Supervise staff 5. Control stock 6. Produce a business plan
5. Communicate professionally	1. Write reports 2. Make an oral presentation 3. Correspond 4. Communicate telephonically 5. Gather information 6. Use a word processor 7. Use spreadsheets 8. Negotiate 9. Mediate

APPENDIX 1.2

QUALITY ASSURANCE PANEL REPORT ON HORTICULTURAL PROGRAMMES

ND, BTECH & MTECH: HORTICULTURE; ND, BTECH & MTECH: LANDSCAPE TECHNOLOGY; and ND & BTECH: OPEN SPACE & RECREATION MANAGEMENT

PROGRAMMES

Report on Quality Assurance Panel meeting held in Room 3.1 (Applied Sciences) on Monday, 11 September 2000 at 19:00

Present:

Mr L Jacobson	QAC representative and Director: Continuing Education
Mr F Pieterse	QAC representative and Director: Facilities Management
Mr J Kruger (Secretary):	Head: Quality Assurance
Industry / employers:	Mr R W Morris (GM Top Turf, Western Cape)
	Mr A Walsh (formerly of Woolworths) (*Alumnus*)
Students:	Mr K Brüseke (OSRM)
	Ms L Julies (ND: Horticulture)
	Mr E Lawrence (BTech: Horticulture)
Technikon:	Prof L Slammert (Dean)
	Mr M H Young (Course Head)
	Mrs V Potterton
	Mr B Theron

1. INTRODUCTION

This report is based on the following:

Programme self-evaluation [SERTEC Annexures S1 (i) and S1 (e)]
Self-evaluation review
Interviews with staff
Interviews with students

2. OVERVIEW OF PROGRAMMES

From the overview of these closely related programmes, and discussions arising from it, some of the salient points that emerged were the following:

- Currently there is no apparent research demand from industry, offers of problem-solving for industry were unsuccessful to date.
- Intake of students in this cluster of programmes was currently running at about 50, of whom 70% were enrolled for Horticulture.

- Combined undergraduate classes for this cluster of programmes make the programmes viable.
- In the latest curriculation revision, a large degree of overlap between programmes was incorporated into the curriculum.
- A general review of programmes might be indicated in view of the industry swing to a preference for a more generic qualification.
- The greenhouse is too small to cope with the number of students using it.
- Computer access and support was insufficient.
- The field of study covered a great diversity in industry, which gave scope to graduates in the employment market.
- Students at risk will have to be identified as early as possible so as to devise support mechanisms in order to lay a solid foundation for the completion of their studies.

3. PERCEPTIONS

3.1 Faculty

- Marketing of the programmes, particularly at schools, is essential - to improve student numbers w.r.t. viability of programmes.
- Language communication problems are already noticeable especially regarding technical vocabularly.
- There is a growing demand for exit points prior to Diploma level, but the problem is whether students at these levels would be work-ready.
- Work stations are not fully representative of the entire industry because of its diversity; however, staff are liaising personally with the broader industry as far as possible.
- Industry input towards shaping the curriculum is difficult on account of the diversity in this field.
- More advanced management and communication skills should be incorporated into the early stages of programmes, bearing in mind that graduates are able to rise to supervisory level within a year.
- Student membership of professional associations is recommended.
- Entrance requirements might be due for reconsideration to make provision for certain prerequisite offerings and or extended programmes; selections at present are based on interviews with prospective candidates.
- Library integration in course work could be improved.
- The Diploma cluster of three programmes is regarded as the base for specialisation at Degree level.
- In the light of departmental capacity, excursions were limited, but relevant (relevant to practical examination and assignments).
- Special guest speakers were used, mainly in the senior phases; the department also draws on the expertise of part-time lecturing staff.
- Staff are improving their qualifications. Research should however benefit the students.
- The Advisory Committee is providing valuable trade input.

3.2 Students

- Students found the programmes demanding and they were positive about their studies and the level of the programmes - programmes generally exceeded their expectations.
- Adequate mechanisms to attend to any problems: student evaluation of lecturers as indicators - although students were not always given specific feedback on their evaluations, action was taken, where necessary, based on such feedback.
- Co-operative education is a valuable experiential learning experience.
- Inadequate computer facilities: cannot be properly integrated on account of poor access - changes due to be implemented 2001.
- Everything possible should be done to ward against student dropout rates.
- Library integration is fair; book stocks not always meeting student needs, while journal collections are good.
- Diploma level studies do not provide adequately for management skills.
- Industry-related competencies, e.g. drafting of a bill of quantities, should be highlighted more.
- Entrepreneurial bias to the programmes is considered essential.
- BTech perceived as lacking scope: no prospect of promotion or extra income in industry.
- More attention to financial (management) aspects seem to be indicated by the employment market.
- Desirability of guest lecturers and talks by specialist visitors.
- Operations at the greenhouse are limited on account of size constraints.
- Membership of / participation in professional institutes to be more readily open to students.

4. PREVIOUS EVALUATION - SERTEC (1997)

Staff to be exposed more to the latest technology in industry

Some, more or less indirect, exposure of staff through conference attendance, industry, meetings and projects was recommended. The original idea of staff working for a specific period in the trade from time to time was not a feasible concept.

Inadequate administrative support staff

Arrangements adequate after internal re-organization.

Academic staff to improve their qualifications

Staff improved qualifications, e.g. two additional M degrees and a doctoral candidate.

Computer facilities to be upgraded

Faculty - dedicated facilities planned for implementation in 2001.

The A, B and C (theory and practical) mix of subject matter to be reviewed

The developments around SAQA / NQF put a temporary halt to this initiative. This was done, by the convenor technikon, in consensus with the other technikons and the trade.

The course content no longer meets the needs of industry

Additional to the above statements more recent developments regarding bridging and academic development, acknowledging the different levels of competence at entrance level, acceptance of prior learning and flexible exit levels justified the decision by technikons offering horticultural programmes to delay recurriculation. Student retention rates should as general practice be continually improved and at the same time the demands of the industry should be borne in mind.

5. CURRENT SELF-EVALUATION

5.1 Strengths

- Demand for graduates and experiential workstation placements exceeds supply.
- Diversity of employment opportunities.
- Qualified and dedicated staff.

5.2 Weaknesses

Shortcomings	Remedies
$ Trade and industry are looking for a more generic product	$ Curriculum redesign strongly and urgently indicated
$ Inadequate computer facilities	$ Plans being implemented for 2001
$ No industry demand for BTech degree	$ Marketing and promotion $ Promote status of graduates $ Negotiate with industry for recognition (also better remuneration) of graduates
$ Cut flower industry not reflected in programmes	$ Curriculum redesign
$ Not sufficiently practice-orientated	$ Curriculum redesign in light of industry demand and SAQA requirements $ Short course design
$ Poor staff research track record	$ Staff attending research work-shops on proposal writing and supervision
$ Programmes lack offering(s) in communication skills	$ Curriculum redesign
$ Diploma as first exit level too inflexible	$ Provision for multiple exit level

- No special provision for accommodating historically disadvantaged students, in particular at 1st level

- Investigate entrance requirements
- Consider further tutoring, academic development and extended curricula
- Curriculum redesign

6. PERFORMANCE INDICATORS

Graduate / employer satisfaction survey
Examination results: annual pass rates and throughput rates
Number of graduates for past 4 years
Graduate employment
Degrees / Diplomas awarded per lecturer per 100 students
Cost-effectiveness of the programme (total cost per graduate)
Research projects completed over past 4 years

7. CONCLUSION

This cluster of programmes seems to reflect the diversity of industry, but the current trend is towards a more generic under-graduate qualification. Curriculum redesign is necessary to be able to meet the needs of trade and industry, while making adequate provision for the entry of historically disadvantaged students into this field of study.

A number of staff have improved their qualifications. Industry needs to be persuaded to accept the development of a research culture so as to give meaning to staff and student efforts, which should be aimed at practical and problem-solving research. Technicians would benefit by development through research projects. Other non-academic staff should be encouraged to attend other development courses.

Students generally seem to feel that their studies are worthwhile and find themselves in demand in the employment market. Generally they are satisfied with the programme, except for the lack of computer facilities.

Industry diversity is not always easy to accommodate, e.g. scant attention to the local and national cut flower industry, which is a major foreign currency generator. Trade is represented on the Advisory Committee, thereby ensuring valuable input.

8. ACCREDITATION

It is recommended that the programmes be accredited.

QUALITY ASSURANCE PANEL FOR HORTICULTURE, LANDSCAPE TECHNOLOGY; AND OPEN SPACE & RECREATION MANAGEMENT

L Jacobson .....

J Kruger .....

A Walsh .....

L Julius .....

L Slammert .....

V Potterton .....

F Pieterse .....

R W Morris .....

K Brüseke .....

E Lawrence .....

M H Young .....

B Theron .....

APPENDIX 2.1

MINUTES OF THE MEETING OF TECHNIKONS OFFERING PROGRAMMES IN HORTICULTURE HELD AT PENINSULA TECHNIKON ON 12 APRIL 2002

Present:	e-mail	Telephone	Fax
M Young (Convenor Technikon)	myoung@ctech.ac.za	(021) 4603210	(021) 4603193
T Volbrecht	volbrecht@ctech.ac.za	(021) 4603378	(021) 4603711
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R Hendrick	rhendric@tsa.ac.za	(011) 4712348	(011) 4712555
C Marx	cmarx@tsa.ac.za	(011) 4712349	(011) 4712555
J Foley	jonathan@ntech.ac.za	(031) 2042321	(031) 2042321
JC Coetzee	coetzeej@mail.pentech.ac.za	(021) 9596174	(021) 9596095
J October	octoberj@mail.pentech.ac.za	(021) 9596175	(021) 9596095
G Dreyer	dreyerg@mail.pentech.ac.za	(021) 9596550	(021) 9596095
M Brinkhuis	brinkhuism@mail.pentech.ac.za		(021) 9596095
C Laubscher (Secretary)	charll@ctech.ac.za	(021) 4603198	(021) 4603193

1. ALL DELEGATES WERE WELCOMED BY THE CHAIRPERSON.

2. HISTORICAL OVERVIEW

The chairperson gave an overview of curriculum development in horticulture in the last ten years. The meeting subsequently discussed the following:
No template or clear guidelines exist at present relative to the procedure to be followed in the registration of technikon qualifications with SAQA. The old Form B has been replaced with a new Form 2. Form C still exists but has also been revised. The functioning of Standards Generating Bodies (SGBs) were discussed. The SGB for Ornamental Horticulture and Landscape was promulgated in November 2001, but to date has not yet been able to commence work. Dr RM Hendrick and Mr MH Young represent technikons on this SGB. All new programmes formulated by other SGBs are available on the SAQA web site. Their unit standards may be incorporated into other programmes. The differences between programmes and qualifications were discussed. The lack of finality on level descriptors, modularisation and the unit standards vs. whole qualifications debate were hampering the process of curriculum development. The meeting believed that the SGB would expect technikons to write at least ND Horticulture courses in unit standard format so that articulation was facilitated form the lowest levels. The SERTEC requirement that one qualification should exist where a 70% overlap in content between qualifications exists was discussed.

3. CAPE AND PENINSULA TECHNIKON PROPOSAL

The Chairperson presented the revision proposal included with the agenda and formulated by Cape and Peninsula Technikons. This proposal was for one National Diploma and BTech with majors on the third and fourth year levels. The electives offered to applicants on their third and fourth levels would prepare students for a career in either the Horticulture or Landscape sectors. These would cater for the following directions:

4. ALTERNATIVE PROPOSAL

Dr Hendrick proposed that the recurriculation be done in unit standards format as his technikon was expecting the SGB for Ornamental Horticulture and Landscape to request that qualifications be written in unit standards format and not in whole qualifications. He stated that he did not think it advisable to go back to the format of the old diploma, that we should revise the courses so that provision is made for the different sectors of the industry. Technikons would then be able to select the combinations that they prefer and present courses accordingly. Pretoria concurred with this sentiment (Mr v/d Berg). It was felt that the proposal was not flexible enough and did not address

the needs of the NQF. Mr v/d Berg stated that unit standards should be used to devise a new flexible package. He expected the SGB to request unit standards for all levels. He also expected to see a demand for small groups of specialisations as opposed to the present large classes and that tuition would have to be adapted to this.

Dr Hendrick stated that the content base approach to curriculum development was no longer being followed is gone and that the outcomes-based approach as spelt out by SAQA should be followed. The levels for unit standards have not been finalised and this could lead to delays. The revised curriculum should have a more flexible mode of delivery and be more regional to meet the needs of clients. A concern is that the existing horticulture qualification has an overload on the curriculum and does not lead to specialisation and unit standards could resolve this issue. Dr Hendrick stated that the focus should be on core components and specialisation to accommodate the sector needs of the industry. The SGB should be supported.

The Chairperson asked Mr Foley to indicate the sentiments of his technikon. He stated that he supported the views of Technikon SA and Pretoria Technikon. He expressed disappointment at the slow progress of the SGB and the lack national co-ordination. Articulation should be at all levels and the aim should be to seek the support of all customers within the industry.

The Chairperson asked Mr Coetzee to review his technikon's position in the light of the views of the three northern technikons. He stated that the old diploma had not been used as a template and that the Cape proposal had been initiated from new, i.e. what were the current needs of the industry. An outcomes-based structure was used and the use of "subjects" in the proposal was only because we were preparing our revision of the existing curricula according to current specifications (CHE's Revised Form B). The use of subjects was a practical way of grouping outcomes in a readily understandable format that was familiar to students, the industry and the technikon administration. He reiterated that the process had not been started by going back to earlier courses. The industry in the Cape expected a horticulturist to be a jack of all trades.

5. SAQA REQUIREMENTS

Mr Terry Volbrecht, Head Curriculum Development at the Cape Technikon stated that the SAQA framework was aimed at customising a curriculum to the needs of individual learners. The curriculum should provide for logical progression on the NQF. The various industry interest groups should be represented on the SGB so that the interests of all sectors and all stakeholders are accounted for. It was important at this stage to decide which qualification would be registered with SAQA by June 2003 and to seriously reflect on which programme would be most feasible? With outcomes-based education the providers will be able to decide which modules to put together regionally or institutionally. Unit standards do not equal modules. A module could comprise several unit standards or it could be only one. Mr Volbrecht expected that each technikon would be allowed to design their own programs.
He reminded delegates that subject-based registration of existing qualifications was required by SAQA by June 2003. Mr Volbrecht stated that the New Academic Policy would also have to be borne in mind and that two streams on the NQF would have to be provided for, General Qualifications and Career-focused Qualifications. Technikons would also have to ensure that their level of qualifications was not less than that of universities on that level.

6. REGISTRATION OF QUALIFICATIONS ON NQF BY JUNE 2003

Dr Hendrick stated that accommodation of learners from lower levels would have to be made and that they would be entitled to learning tracks. He believed that outcomes-based programs would have to be developed through the SGB process. All sectors would have to be catered for. It would not be possible to focus on one area or specialisation only. He reminded delegates that our first milestone was to meet the first date of June 2003, i.e. for the registration of qualifications with SAQA. The Chairman stated that the CTM's Curriculum Working Group was currently finalising the procedure to be followed by all convenor technikons.

The Chairman stated that we are faced with two processes. The qualifications submitted for interim registration in June 2000 must be submitted to SAQA for full registration. This could be seen as the shorter term goal, to be followed by the submission through the SGB for Horticulture of unit standards for all qualifications. The meeting agreed that this should be its *modus operandi.*

7. WRITING UNIT STANDARDS FOR THE HORTICULTURAL INDUSTRY

Mr G Dreyer asked what the advantages of following unit standards would be to the horticultural industry. Dr Hendrick stated that he believed that they were more efficient and cost effective than present qualifications. Each technikon in its own right would manage its own selection of qualifications and one would have the development of unique programmes at individual technikons. Dr Hendrick stated that it was important to be pro-active and involve the industry. One could also adapt what is already there, i.e. unit standards already written for other fields of study and also those written for the horticultural industry in the UK, Scotland and Australia. Gilbert Brisco, SANA (Workgroup with Di Goodwin) and the Institute of Environment and Recreation Management have completed a lot of work on formulating standards. Mr Volbrecht stated that a working group was needed to look at the overseas standards and determine how they can be adapted.

The following points of query were raised in connection with unit standards:

- This group should be involved in all levels to assist in ensuring the progression across levels is optimised.
- Each Technikon should select the number of unit standards that it felt it had capacity to present.
- Unit standards should be grouped into modules and then presented.
- One would probably need many unit standards of a broad range on the lower levels and on higher levels one would need fewer, but of a higher level of competency. A danger is seen to exist in the creation of micro subjects.
- The difference between subjects and modules was not clear.
- SANA have got workgroups studying sectors within its ambit.
- The definition of a unit standard was not clear. An example could be "Apply appropriate knowledge and equipment to produce plants".
- Unit standards make up qualifications. Modules make up a unit standard or the other way around. Unit standards are based on qualifications. How many modules per unit standard? Higher levels give more emphasis on core level than fundamental levels.

8. PROCEDURES TO BE FOLLOWED IN WRITING UNIT STANDARDS

The meeting agreed that it was important that the SGB be supported as far as possible. It is not certain what they may require of technikons, but we could assume that we would be called upon to play a vital role in the writing of unit standards. This would likely not be limited to the Higher Education Band of the NQF. Where necessary subject specialists and any necessary outside input should be obtained to assist in writing unit standards. The Chairperson stated that working groups working both regionally and nationally would be required to co-ordinate the writing of unit standards for the different sectors.

The meeting agreed to form a SGG representing the technikon sector and to write unit standards for levels 5 - 8 of the different sectors of the industry. This should be rationalised where overlaps occur. The following procedure was agreed upon:

- Identify areas of specialisation (sectors of industry)
- Identify fields of expertise (eg. irrigation, soil science)
  Draw up unit standards
- Decide with industry on appropriate exit levels
- The needs of students must remain paramount. The diploma level should be as general and generic as possible to help student to master the principles, rather that to train students for a limiting over-specialisation.
- Each technikon would decide which directions they wanted to follow. This would depend upon their capacity, level of expertise and their market.
- Format for doing unit standards is available on the SAQA website.

Credits: 1 credit = 1200 notional hrs per year, Certificate = 120 credits, Diploma = 240 and Degree = 360 credits.

The meeting identified the following sectors within the horticultural industry and the technikons listed adjacent to each of these was asked to undertake the writing of unit standards:

TURFGRASS - Pretoria Technikon

PRODUCTION HORT	-	Cape Technikon
RETAIL HORT	-	Peninsula Technikon
FLORICULTURE		- Technikon SA
AMENITY HORT		- Natal Technikon
LANDSCAPE	-	Natal Technikon
ARBORICULTURE	-	Technikon SA

The following programme was agreed upon:

WHAT	Get an initial draft within one year for levels 5,6,7 and 8a	
WHEN	Interim to 6 months - copies to M Young	11 October 2002
	Email M Young and submit by	14 March 2003
	Final meeting - all technikons	14 April 2003
	Discussion with industry after	14 April 2003
	Link with industry to formulate unit standards.	
FORMAT	Use guidelines on SAQA website, also from CTM as these become available	

9. GENERAL

The Chairman stated that he would contact the SAQA co-ordinator for the available unit standards which would be of concern to us, i.e. those that have already been written by related SGSs. This was distributed to other Technikons.

Mr Foley queried how the learner syllabus for experiential training would be affected and what learning was expected. It was assumed that technikons would retain their one year of experiential training for the diploma, but that the mechanics of how this would be structured would have to be discussed at a later stage. Mr Coetzee stated that the evaluation for experiential training could take place after the first 6 months of practical or at the end of the training period. Dr Hendrick said that one of the options for mastering and demonstrating competence was to download standards and to develop skills. This could be done at the workplace. Outcomes-based education and training meant both gaining knowledge and mastering skills. We would be required to write Unit Standards indicating what our outcomes should be and how we suggest these be achieved.

The Chairman thanked everyone for their attendance. The meeting closed at 14H55.

CHAIRPERSON

APPENDIX 3.1

INTERVIEW SCHEDULE FOR PERSONAL INTERVIEWS

DEPARTMENT OF HORTICULTURE SCIENCE

INTERVIEW SCHEDULE TO EMPLOYERS IN HORTICULTURE – HORTICULTURAL SKILLS COMPETENCIES IN SOUTH AFRICA (INCLUDES LANDSCAPE TECHNOLOGY AND OPEN SPACE AND RECREATION MANAGEMENT)

1. NAME:.....

2. ADDRESS: .....

3. TEL.NO.: ..... FAX.NO.: .....

   E-MAIL: .....

4. Please list your qualifications: .....

5. Where employed (and position)?: .....

6. Nature of company's business?: .....

7. How long have you worked in this sector of the trade? .....

8. What other sector's have you worked in? (List please, also length of time in years):

   .....

9. Please make a list on the attached Annexure A of all the skills/competencies which you expect of a horticulturist with a 3 year national diploma (includes Landscape Technology and Open Space and Recreation Management):

10. Please indicate also on Annexure A (see column 2) which of these skills/competencies are inadequately provided for in technikon training in SA?

11. Please use column 3 of Annexure A to motivate why you answered as you did in question 10.

12. Does your company provide structured in-service training?

12.1 If yes, to which levels: Management .....

Supervisory .....

Craft and labour .....

12.2 Please specify the training to: Management .....

Supervisory .....

Craft and labour .....

12.3 Who provides the training? Management .....

Supervisory .....

Craft and labour .....

13. Regarding the NQF (National Qualification Framework), do you consider yourself?

WELL INFORMED	REASONABLY INFORMED	POORLY INFORMED

14. Please study the "critical outcomes" on Annexure B (SAQA). These are to be incorporated into all qualifications. Please help us identify how you think they may best be learnt by learners (either at Technikon or during in-service training):

15. Please specify the challenges you see facing the horticultural industry in the next 5 – 10 years?

.....

.....

16. Please evaluate the structure of professional horticulture in SA (in terms of its representativity in professional and other bodies)?

.....

.....

17. Please specify (with a short motivation) what problems you see in the education and training of all levels of staff in the horticultural industry:

.....

.....

18. Please add any other comments you may wish?

Thank you for your participation.

SKILLS/COMPETENCIES REQUIRED OF A HORTICULTURIST / LANDSCAPE TECHNOLOGIST AND OPEN SPACE AND RECREATION MANAGER

COLUMN 1: Make a list of skills/competencies you expect of a 3 year diplomate	**COLUMN 2:** Which of the skills/ competencies listed in Column 1 are inadequately provided in a newly qualified diplomate	**COLUMN 3:** Motivation for answering Column 2

CRITICAL OUTCOMES	
1. **Identify and solve problems** in which responses display that responsible decisions using critical and creative thinking have been made.	
2. **Work effectively with others** as a member of a team, group, organisation, community.	
3. **Organise and manage oneself** and one's activities responsibly and effectively	
4. **Collect, analyse, organise and critically evaluate information**.	
5. **Communicate effectively** using visual, mathematical and/or language skills in the modes of oral and/or written presentation.	
6. **Use science and technology effectively** and critically, showing responsibility towards the environment and health of others.	
7. **Demonstrate an understanding of the world** as a set of related systems by recognising that problem-solving contexts do not exist in isolation.	

APPENDIX 3.2

LETTER OF INVITATION TO FOCUS GROUPS

CAPE TECHNIKON

Dear Colleague

SURVEY OF HORTICULTURAL SKILLS / COMPETENCIES PARTICIPATION IN FOCUS GROUP DISCUSSIONS

As I mentioned to you telephonically, I am currently undertaking an investigation into the skills / competencies which we expect of a qualified horticulturist. This is being done through a series of focus groups meetings. A least one meeting will be held for each of these seven sectors of the horticultural industry:

Amenity horticulture
Arboriculture
Floriculture
Landscape
Nursery production
Nursery retail
Turf

The objective of the investigation is primarily the determination of core and specific skills / competencies for each of these seven sectors.

The revision of the technikon programmes in horticulture will therefore be able to be undertaken with these results as the base. Your participation in this exercise is greatly appreciated. You will be participating in the focus group for the ..... Sector.

We accordingly look forward to meeting with you on ..... at 12:30 in Seminar Room 2.2 in the Cape Technikon Library. We will conclude punctually at 15:30. Light refreshments will be served.

Thank you again for agreeing to participate.

Yours sincerely

MIKE YOUNG
PROJECT CO-ORDINATOR

APPENDIX 3.3

AGENDA / PROGRAM FOR FOCUS GROUP INTERVIEWS

CAPE TECHNIKON

FOCUS GROUP INTERVIEWS

AGENDA

12:30	WELCOME
12:35	EXPLANATION BY MODERATION OF PROCEDURE TO BE FOLLOWED IN MEETING
12:40	**QUESTION 1** – VALUES
13:00	**QUESTION 2** – ATTRIBUTES / QUALITIES
13:10	**QUESTION 3** – PROBLEMS / CHALLENGES
13:20	**QUESTION 4** – CHANGES TO SECTOR
13:30	REFRESHMENTS
13:45	**QUESTION 6** – IDENTIFICATION OF OVERALL SKILLS / COMPETENCIES
14:15	**QUESTION 7** – IDENTIFICATION OF SPECIAL SKILLS / COMPETENCIES
15:00	**QUESTION 5, 8 – 11** – GENERAL
15:30	CONCLUSION

YOUR PARTICIPATION IS GREATLY APPRECIATED

THANK YOU

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Program for Focus Groups						
February 2001	19 Landscape Focus Group B	20 Turf Focus Group B	21 Nursery Retail Focus Group B	22 Amenity Horticulture Focus Group B	23	
	26 Turf Focus Group A	27	28 Landscape Focus Group A			
				01 Nursery Retail Focus Group A	02 Amenity Horticulture Focus Group A	
March 2001	05 Production Horticulture Focus Group B	06 Floriculture Focus Group	07 Landscape Focus Group C	08	09 Production Horticulture Focus Group A	
	12	13	14 Amenity Horticulture Focus Group C	15 Arboriculture Focus Group	16	

Appendix 3.4
Program for Focus Groups

APPENDIX 3.5

QUESTIONNAIRE FOR FOCUS GROUP INTERVIEWS

CAPE TECHNIKON

DEPARTMENT OF HORTICULTURAL SCIENCES

SCHEDULE OF QUESTIONS FOR FOCUS GROUPS INVESTIGATING THE SKILLS REQUIRED FOR A HORTICULTURIST OPERATING IN ONE OR MORE OF THE FOLLOWING SECTORS:

TURF	FLORICULTURE
LANDSCAPE	ARBORICULTURE
NURSERY RETAIL	AMENITY HORTICULTURE
NURSERY PRODUCTION	(INCLUDES BOTANICAL GARDENS)

NAME: ..... TEL.NO.: .....

PLEASE ANSWER THE FOLLOWING QUESTIONS PRIOR TO YOUR ATTENDING YOUR FOCUS GROUP SESSION. YOU WILL NEED TO HAND IN THIS SCHEDULE ON THAT DAY. (Please use an additional sheet of paper should you require it)

1. Name in your opinion the most important values (eg. to conserve water) in the field of horticulture? Please rank the most important 5 of these in order of importance i.e. by noting a 1 to 5 next to the respective values:

   .....

   .....

   .....

2. Name the most important attributes or qualities employers desire in a horticulturist? Please rank the most important 5 of these in order of importance i.e. 1 to 5 (as above).

   .....

   .....

3. Consider for a moment the problems or challenges which you regard as typical of your sector of horticulture (eg. Floriculture). Please list as many as you can and rank the most important 5, again as was done above:

   .....

   .....

4. How has this sector of horticulture changed in the last 10 years? How do you expect it to change in the next 5 years?

.....

.....

.....

5. To identify the contextual framework of this sector, please list briefly those key aspects which are special to and which define this sector of horticulture (eg. sell plants or grow cut flowers)?

.....

.....

.....

6. Please identify the overall skills (also called core skills or competencies) which are typical of a horticulturist working in this sector of horticulture. (Please rank broadly so that you end up with about 7 core skills eg. propagate plants):

.....

.....

.....

7. Please identify say another 5 to 7 specific skills within each of the above core skills you have just listed (**Hint:** number the core skills above say 1 to 7 and below fill in the specific skills, eg. 1. Propagate plants, 1.1 sexual propagation, 1.2 vegetative propagation):

1.		2.	
1.1	.....	2.1	.....
1.2	.....	2.2	.....
1.3	.....	2.3	.....
1.4	.....	2.4	.....
1.5	.....	2.5	.....
1.6	.....	2.6	.....
1.7	.....	2.7	.....
3.		4.	
3.1	.....	4.1	.....
3.2	.....	4.2	.....
3.3	.....	4.3	.....
3.4	.....	4.4	.....
3.5	.....	4.5	.....
3.6	.....	4.6	.....
3.7	.....	4.7	.....

5.		6.	
5.1	.....	6.1	.....
5.2	.....	6.2	.....
5.3	.....	6.3	.....
5.4	.....	6.4	.....
5.5	.....	6.5	.....
5.6	.....	6.6	.....
7.		8.	
7.1	.....	8.1	.....
7.2	.....	8.2	.....
7.3	.....	8.3	.....
7.4	.....	8.4	.....
7.5	.....	8.5	.....
7.6	.....	8.6	.....

8. Please consider all those aspects of the job that qualified horticulturists struggle with when they first start working (say in their first 5 years) *[or put differently "what are the skills you wish the Technikon had taught but got taken for granted?"]* Please rank these as before from 1 to 5.

.....

.....

.....

9. Considering the above core and specific skills, what background knowledge (eg. botany, science, maths) do you think is important in being able to fully apply them?

.....

.....

.....

10. What criteria do you think the Technikon should bear in mind in selecting students for this sector of horticulture? Please rank these again from 1 to 5:

.....

.....

.....

11. Please indicate the number of years that you have spent in the different sectors:

Turf	Floriculture .....
Landscape	Arboriculture .....
Nursery Retail	Amenity Horticulture .....
Nursery Production	Other (Specify) .....

12. Please use the space below to make any other comments:

.....

.....

.....

THANK YOU FOR COMPLETING THIS SCHEDULE.

PLEASE REMEMBER TO BRING IT WITH TO OUR FOCUS GROUP MEETING

Enquiries: Mike Young or Douglas Dyers
Tel.no.: 021-4603210

APPENDIX 3.6

TABULATION FORMS FOR RECORDING DATA FROM FOCUS GROUP INTERVIEWS (EXAMPLE)

AMENITY HORTICULTURE A

Question 6 and 7 CORE SKILLS (listed in priority sequence, with % ranking)				
	1 Horticultural Skills =25%	1 Horticultural Skills (continued)	2 Managerial / Organisational = 20%	3 Plant Knowledge = 18%
Specific Skill (no sequence)				

CAPE TECHNIKON

Department of Horticultural Sciences

National Survey of
HORTICULTURAL* COMPETENCIES / SKILLS
*includes the related fields of Horticulture, Landscape Technology and Parks and Recreation Management

Dear Colleague

Any horticulturist will tell you how varied his or her job is! How does one provide for training when horticulturists work on golf greens, in production glasshouses and on landscape construction sites? The national diplomas in Horticulture, Landscape Technology and Parks (Open Space) and Recreation Management have provided the formal training for horticulturists, landscape technologists and parks and recreation managers (we'll call them all horticulturists in this document because of the overlap of 75% in the curricula!) for many years. This questionnaire is aimed at gathering information on a national basis on the competencies or skills we require of horticulturists today (irrespective of their specific qualifications and/or background).

I am sure that you will agree that in an era of rapid change, training in our industry must be dynamic and learning programmes geared to place our graduating horticulturists at the forefront of available technology. I am undertaking this study as part of my own postgraduate research because I believe it to be important that we take cognisance of the real needs of the varying job requirements. The data gathered will be made available to the technikons which offer horticultural programmes, therefore enabling them to revise the above diplomas (last revision was more than 10 years ago). The SGB (Standards Generating Body) for Horticulture have also indicated that they would like to make use of the information for the generation of unit standards, something which has to be done for all levels of training.

A process of random sample selection was used to select either yourself or your company/institution to receive this questionnaire. You are kindly urged to complete the questionnaire and return it to the coordinator BEFORE 13 September 2001 (contact details on page 3 of questionnaire). This will take approximately 30 minutes. Your commitment in time will ensure that your input is included in the proposals for revision.

I have listed further information on the survey as well as directions on how to complete the questionnaire on the following page. Please read this carefully before completing the questionnaire.

YOUR RESPONSE TO THIS QUESTIONNAIRE IS IMPORTANT TO THE FUTURE OF HORTICULTURAL TRAINING IN SOUTH AFRICA.

THANK YOU!

Mike Young
PROJECT COORDINATOR
CAPE TECHNIKON

For further information: Contact Mike or Douglas at tel no. (021) 460 3210.

N.S. Die vraelys is op die keersy in Afrikaans beskikbaar. Sou u die vraelys per epos ontvang het, maak asseblief die aanhangsel "Vraelys in Afrikaans" oop. Sou u nie 'n Afrikaanse weergawe ontvang het nie, doen asseblief by die koordineerder navraag.

ADDITIONAL INFORMATION AND DIRECTIONS ON COMPLETING THE QUESTIONNAIRE

- As mentioned above, this questionnaire has been sent to a randomly selected number of members of all the professional bodies in SA.
  a) As a member in your **personal capacity**, please go ahead and complete the questionnaire, whether you are an employee of a company/institution or not.
  b) However if the questionnaire has come to your **company /institution**, may I ask that you direct for completion a copy (or photocopy if necessary or contact myself for additional copies) to at least one horticulturist in every sector (see seven sectors below) of your company/institution. (You may want to have these re-directed to yourself for submission to myself or alternatively they can be returned to me directly.)

- The certification body for technikons (SERTEC) has for some years already indicated that serious consideration should be given to the institution of one national diploma with elective subjects say in the third year instead of the current three diplomas, i.e. Horticulture, Landscape Technology and Parks (Open Space)and Recreation Management. The latter has largely been phased out over the last three years and is only offered on first year level by Technikon SA. It does not seem sensible to retain in the existing format the three diplomas with their 75% overlap in subjects. You may wish to comment on this on the last page (see question 14: Comments).

- This survey questionnaire is the second phase of the research project. This first phase comprised fourteen focus group interviews which were responsible for preliminary investigations. The members of the focus groups were representative of the seven identified sectors of the horticultural industry. Some of the questions in this survey are based on the outcome of the first phase.

- The seven sectors are listed below. In this questionnaire, we will be studying the competencies or skills of each of these. You may complete the questionnaire for more than one of the sectors provided that you have either a qualification (also including Landscape Architecture, Agriculture, etc.) in these sectors or alternatively have experience in one or more of these sectors so that you are a practicing horticulturist. These sectors are:

Amenity Horticulture(includes public sector horticulture and botanical gardens)
Arboriculture
Floriculture
Landscape (includes indoor and outdoor, landscape maintenance and landscape irrigation)
Nursery-retail
Nursery-production (or wholesale)
Turf (all sports fields construction and maintenance)

- Please remember that for the purpose of this project, all activities represented by these sectors will be considered as HORTICULTURE and graduates from any of the above three diploma/degree courses will be considered HORTICULTURISTS.

- The questionnaire is divided into two sections:
Section A: General and biographical (Questions 1 - 7)
Section B: Identification of competencies/skills, etc. (Questions 8 - 14)

- The directions for each question are listed together with the question. Most require you to select an option by making a right tick, allocating a mark from 1 to 5, or allocating a percentage figure per item (in latter case, please ensure these add up to 100%). Note that in all questions where a list of sectors, fields of learning, etc. is given, these have been placed in alphabetical order.

- We will speak of **competencies** or **skills** as synonyms, meaning by this "anything you can show that you know and can do". The South African Qualifications Authority call these **outcomes**.

- May we also assure you of the confidentiality of your response to this questionnaire. If there are any questions that you would rather not answer, please go on to the next question. Please also be candid when answering the questionnaire. You may of course comment on any other aspects relative to the training of horticulturists. If necessary, please use additional pages.

FURTHER HELP

Please indicate if you would like to be involved in any further investigations into either the training of horticulturists or horticultural staff:

1. Horticulturists

YES	NO

2. Horticultural staff

YES	NO

3. Other: .....
(specify)
.....

DIRECTIONS TO RETURN QUESTIONNAIRE

Kindly return to Mr Mike Young by either:

Fax to: (021) 460 3193
E-mail: myoung@ctech.ac.za (This is the easiest. Simply complete on-line and e-mail back to me)
Mail to: Department of Horticultural Sciences
Cape Technikon
P O Box 652
Cape Town
8000

YOUR CONTACT DETAILS

Please indicate your contact details below. These are required for research/record purposes only, your completion of these details is voluntary. May I again state our commitment to confidentiality:

Initials, surname and title: .....

Tel no: .....

Alternative tel no: .....

Fax no: .....

E-mail: .....

Postal Address: .....

.....

.....

Where employed: .....

Position: .....

SECTION A: GENERAL AND BIOGRAPHICAL

1. Please identify below:
a) the **sectors** of the industry that your company/institution operates in;
b) how many **horticulturists** (i.e. both those qualified and also those practising as horticulturists based upon experience) work in each of these sectors:

SECTORS	(✓) Sectors your company/institution works in	Indicate number of horticulturists in each sector
AMENITY HORTICULTURE		
ARBORICULTURE		
FLORICULTURE		
LANDSCAPE		
NURSERY - PRODUCTION		
NURSERY - RETAIL		
TURF		
OTHER:		

REMINDER OF DIRECTIONS ON COMPLETING QUESTIONNAIRE FOR COMPANIES/INSTITUTIONS: PLEASE ENSURE THAT AT LEAST ONE HORTICULTURIST HAS THE OPPORTUNITY TO COMPLETE A COPY OF THIS QUESTIONNAIRE FOR EVERY SECTOR THAT YOUR COMPANY/INSTITUTION OPERATES IN

2. Please identify which sector you are **primarily employed** in at the present time (choose only one):

SECTORS	(✓) Indicate sector only
AMENITY HORTICULTURE	
ARBORICULTURE	
FLORICULTURE	
LANDSCAPE	
NURSERY - PRODUCTION	
NURSERY - RETAIL	
TURF	
OTHER: ..... (specify)	

3. Does your company/institution provide **in-service training programmes** (eg. computer course) to horticulturists (i.e. not day-to-day training by supervisors or the training of students)?

Please indicate:

YES	**NO**

If **NO**, please go on to question 4

If **YES**, please specify the topics or areas of training that horticulturists are exposed to:

TOPICS OR AREAS OF TRAINING	(✓) off where applicable
Communication	
Computer skills	
Entrepreneurial/business	
Horticultural	
Labour and related aspects	
Legislation	
Machinery/equipment	
Marketing/public relations	
Managerial	
People skills	

Pests, weeds and disease control	
Other: ..... (specify)	

4. Please list the **qualifications** (also short-courses) which you have obtained under each of the sectors listed below:

SECTORS	Qualifications (also where qualified)	When qualified
AMENITY HORTICULTURE		
ARBORICULTURE		
FLORICULTURE		
LANDSCAPE		
NURSERY-RETAIL		
NURSERY-PRODUCTION		
TURF		
OTHER:..... (specify)		

5. Please list the **number of years of experience** you have in each of the sectors i.e. irrespective of whether you have been working in more than one sector at a time:

SECTORS	Years experience	Where employed
AMENITY HORTICULTURE		
ARBORICULTURE		
FLORICULTURE		
LANDSCAPE		
NURSERY-RETAIL		

NURSERY-PRODUCTION		
TURF		
OTHER..... (specify)		

6. Please indicate the **broad division of responsibilities** in your current position in terms of: a) horticultural related, b) managerial/administrative and c) other responsibilities:

BROAD TYPES OF RESPONSIBILITIES	Division of responsibilities where you spend most of your time (as a %)
a. Horticultural	
b. Managerial/administrative	
c. Other (specify)	
	100%

7. Please suggest an **appropriate name** for a horticulturist working in your sector (eg. horticulturist in Arboriculture = Arborist):

a) name of your sector: .....
b) suggested name for horticulturist:

.....

SECTION B: IDENTIFICATION OF COMPETENCIES/SKILLS

8. In Phase 1 of this research project, focus groups for each sector identified the following **fields of learning (i.e. a group of competencies or skills)** which represent the work of a graduate, i.e. a recently qualified horticulturist working in that sector. Your assistance is required in this question to allocate the time a student studying for a career in your sector should spend on each of the fields of learning:

a) Would you please select the sectors below to which you have been exposed, i.e. in which you have either a qualification or experience and allocate a weighting in percentages to each of the fields of learning. You may add other fields of learning if you wish using the other category;

b) Indicate, in your opinion, how well graduates, immediately after completing their formal education, have readied or prepared themselves for each field of learning:

LIST OF IDENTIFIED FIELDS OF LEARNING	a) Allocate a % to each	b) How well prepared are graduates? 1=Not prepared 2=Poorly prepared 3=Adequately prepared 4=Well prepared 5=Very well prepared
8.1 Amenity Horticulture		
Community Recreation		
Environmental Management		
Horticulture		
Landscape		
Management		
Other:..... (specify)		
	100%	

8.2 Arboriculture		
Arboriculture and the law		
Arboricultural skills		
Education/Training		
Environmental Management		
Management		
Other:..... (specify)		
	100%	

8.3 Floriculture		
Communication		
Economics and Marketing		
Harvesting and post-harvesting		
Management		
Pests, weeds and disease management		
Plant knowledge		
Technical/equipment/ structures		
Other:..... (specify)		
	100%	

8.4 Landscape		
Communication		
Equipment (logistics)		
Horticultural		

Irrigation		
Landscape design		
Landscape construction		
Management		
Other:..... (specify)		
	100%	

8.5 Nursery - retail		
Communication		
Environmental Management		
Landscape		
Management		
Plant knowledge		
Pest, weeds and disease management		
Retailing		
Soil Science		
Other: ..... (specify)		
	100%	

8.6 Nursery - production		
Communication		
Cultivation/growing		
Irrigation		
Management		

Marketing		
Nursery development and maintenance		
Pests, weeds and disease management		
Plant knowledge		
Propagation		
Other:..... (specify)		
	100%	

8.7 Turf		
Agronomy/cultural practices		
Construction		
Environmental Management		
Irrigation		
Management		
Mechanisation		
Pests, weeds and disease management		
Soil Science		
Other: ..... (specify)		
	100%	

Comments:

.....

.....

9. This question is a follow-up to Question 8. Please identify for each field of learning (eg. communication) within your specific sector, 5 - 7 **specific competencies/skills** (eg. writing reports or public speaking) you regard as important.

a) Name your specific sector(eg. Arboriculture):.....
b) Please write in the names of the fields of learning of your sector (eg 1. Arboriculture and the law, 2. Arboricultural skills)
c) list 5 - 7 specific competencies/skills you regard as important within each field of learning in your sector:

[Please use a separate page for a second or third sector]

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10. Phase 1 of this project also identified the following broad **attributes (i.e. characteristic qualities)** employers desire in a horticulturist entering into their employment. Please indicate in the columns provided and on a scale of 1 - 5;
a) how important you regard each of the listed attributes to be; and
b) how well you think horticulturists in general are achieving the attributes.

ATTRIBUTES (i.e. characteristic qualities)	a) **Importance**: Score between 1 - 5 1=No importance 2=Low importance 3=Average importance 4=Fair importance 5=Extreme importance	b) **Achievement:** Score between 1 - 5 1=No achievement 2=Low achievement 3=Average achievement 4=Good achievement 5=Excellent achievement
Business skills (also professionalism)		
Commitment (responsibility, dedication, hardworking, accuracy, etc.)		
Communication and computer literacy		
Creativity (lateral thinking, innovation)		
Initiative (self starter, self motivation, etc.)		
Integrity (honesty, sincerity, work ethics)		
Interpersonal relations (people skills, staff and clients)		

Leadership skills		
Management skills (also planning and organising)		
Passion for plants and the environment		
Personal growth, development and confidence		
Plant management and technical skills		
Problem solving (also practical application)		
Willingness to learn and ability		

11 Should you prepare the **course of study** for a student who is studying for a career in your sector, how would you sub-divide his/her time (or exposure) to both your sector as well as to the other sectors: (Please indicate this below, again as percentages, remembering that you could indicate 100% to your sector if you believe a student needs to be fully specialised in that sector.)

SECTORS	Tick off your sector	Indicate a % time to be spent on course for each sector
Arboriculture		
Amenity horticulture		
Floriculture		
Landscape		
Nursery - production		
Nursery - retail		
Turf		
		100%

12. Presume a horticulturist in your sector has been qualified for more than two years. How would you sub-divide his/her **responsibilities**? (Please indicate as percentages)

TYPES OF RESPONSIBILITIES	After 2 years (%)	After 5 years (%)	After 10 years (%)
Horticultural			
Management/Administrative			
Other:..... (specify)			
	100%	100%	100%

13. Please use the space below to make any other **suggestions** pertaining to the training of horticulturists.

.....

.....

.....

14. OTHER COMMENTS:

.....

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.....

Thank you for your kind cooperation

CAPE TECHNIKON

Departement van Tuinbou Wetenskappe

Nasionale Opname van
TUINBOU * BEVOEGDHEDE / VAARDIGHEDE
*sluit in die verwante terreine van Tuinbou, Landskaptegnologie en Parke- en Rekreasiebestuur

Geagte Kollega

Alle tuinboukundiges gaan vir u vertel dat hul werk baie uiteenlopend van aard is! Hoe verskaf 'n mens opleiding waar tuinboukundiges op gholfsetperke, in produksieglashuise en op landskap konstruksiepersele werksaam kan wees? Die nasionale diplomas in Tuinbou, Landskaptegnologie en Parke- (Oopruimte) en Rekreasiebestuur het al vir baie jare die formele opleiding aan tuinboukundiges, landskaptegnoleë en parke- en rekreasiebestuurders verskaf (ons sal in hierdie dokument na almal as tuinboukundiges verwys vanweë die oorvleueling van 75% in die kursus samestellings van die drie diplomas!). Die doelstelling met hierdie vraelys is die insameling op 'n nasionale basis van die bevoegdhede of vaardighede wat ons deesdae van 'n tuinboukundige sou kon verwag (ongeag hul spesifieke kwalifikasies en/of agtergrond).

Ek is seker dat u sou daarmee met my eens wees dat deesdae met die vele en vinnige veranderinge, opleiding binne ons bedryf dinamies moet wees en leerprogramme so opgestel moet wees om ons gekwalifiseerde tuinboukundiges aan die voorpunt te plaas van die nuutste tegnologie. Hierdie studie word onderneem as deel van my eie nagraadse navorsing omdat ek glo dat dit baie belangrik is dat ons kennis moet neem van die verskillende opleidingsbehoeftes binne die afwisselende werksvereistes. Alle data wat ingesamel sal word, sal aan die technikons wat tuinbouprogramme aanbied, beskikbaar gemaak word, wat vir hulle van hulp sal wees met die hersiening van die bovermelde diplomas (laaste hersiening was meer as tien jaar gelede). Die LGS (Liggaam vir die Generering van Standaarde) vir Tuinbou het ook al aangedui dat hulle graag van die inligting gebruik sal wil maak met die opstel van eenheidsstandaarde, 'n taak wat vir alle vlakke van opleiding gedoen moet word.

Na aanleiding van 'n proses van ewekansige steekproefneming is of u of u maatskappy/instelling geselekteer om hierdie vraelys te ontvang. U word vriendelik tog dringend versoek om die vraelys te voltooi en VOOR 07 September 2001 aan die koördineerder terug te besorg (kontak besonderhede verskyn op bladsy 4). Dit sal ongeveer 30 minute neem om te voltooi, maar u voltooing daarvan sal verseker dat u insette ingesluit sal word in die voorstelle vir hersiening.

Bykomende inligting oor die opname asook aanwysings vir die voltooiing van die vraelys, word op die volgende bladsy gegee. Sal u asseblief hierdie noukeurig deurlees alvorens u die vraelys voltooi?

U BEANTWOORDING VAN HIERDIE VRAELYS IS BELANGRIK VIR DIE TOEKOMS VAN TUINBOUKUNDIGE OPLEIDING IN SUID AFRIKA!

BAIE DANKIE!

Mike Young
PROJEK KOÖRDINEERDER
KAAPSE TECHNIKON

Vir verdere inligting: Skakel vir Mike of Douglas by tel no. (021) 4603210

BYKOMENDE INLIGTING EN AANWYSINGS VIR DIE VOLTOOIING VAN DIE VRAELYS

- Soos hierbo vermeld, is hierdie vraelys aan 'n ewekansige geselekteerde getal lede van al die professionele liggame in SA gestuur.
  a) As lid in u **persoonlike hoedanigheid**, sal u asseblief voortgaan en die vrealys voltooi, of u 'n werknemer van 'n maatskappy/instelling is, of nie.
  b) Indien hierdie vraelys egter aan u **maatskappy/instelling** geadreseer was, wil ek u versoek om ten minste een tuinboukundige vanuit elke sektor (sien sewe sektore hieronder) te vra om die vraelys te voltooi (u kan fotostate maak indien nodig of my kontak vir addisionele afskrifte). (Dit sou miskien raadsaam wees dat hierdie vraelys na u toe terug gestuur word vir versending na my of andersins kan hulle dit maar direk na my stuur.)

- Die sertifiseringsliggaam vir technikons (SERTEC) het al vir 'n paar jaar aangedui dat ernstige oorweging geskenk moet word aan die instelling van een nasionale diploma met keusevakke in die derde jaar in plaas van die huidige drie diplomas, t.w. Tuinbou, Landskaptegnologie en Parke- (Oopruimte) en Rekreasiebestuur. Laasgenoemde diploma is grotendeels al oor die afgelope drie jaar uitgefaseer en word tans op eerstejaar-intreevlak slegs deur Technikon SA aangebied. Dit blyk nie prakties te wees om die drie diplomas te behou in die huidige formaat met die oorvleueling van 75% van die kursusse nie. Sou u hierop kommentaar wou lewer, gebruik asseblief die ruimte onder Vraag 14 (Opmerkings) hiervoor.

- Hierdie opname is die tweede fase van hierdie navorsingsprojek. Die eerste fase het uit veertien fokusgroeponderhoude bestaan wat verantwoordelik was vir die aanvangsondersoek. Die lede hiervan was verteenwoordigend van die sewe geidentifiseerde sektore van die tuinbou bedryf. Van die vrae in hierdie opname is op die uitslag van die eerste fase gebaseer.

- Die sewe sektore word hieronder gelys. In hierdie opname, wil ons die bevoegdhede of vaardighede van elk bestudeer. U mag die vraelys vir meer as een van die sektore voltooi mits u 'n kwalifikasie (insluitend Landskap Argitektuur, Landbou, ens.) in hierdie sektore het of andersins ondervinding het in een of meer van die sektore. In hierdie geval is u dan 'n praktiserende tuinboukundige. Hierdie sektore is:

Baangras ("Turf")(sluit in die konstruksie en onderhoud van alle sportsvelde)
Blommekweek ("Floriculture")
Boomteelt ("Arboriculture")
Gemeenskapstuinbou ("Amenity Horticulture")(sluit publieke sektor tuinbou asook botaniese tuine in)
Kwekery - kleinhandel
Kwekery - produksie (of groothandel)
Landskap (sluit in landskap binne en buite, landskaponderhoud en landskapsbesproeiing)

- Neem kennis asseblief dat vir die doeleindes van hierdie projek, alle werksaamhede van hierdie sektore as TUINBOU beskou sal word en dat alle gekwalifiseerdes van enige van die bovermelde drie diploma/grade as TUINBOUKUNDIGES beskou sal word.

- Die vraelys is soos volg onderverdeel:
  Afdeling A: Algemeen en biografies (Vrae 1 - 7)
  Afdeling B: Identifikasie van bevoegdhede/vaardighede (Vrae 8 - 14)

- Die aanwysings vir elke vraag word by die vraag verskaf. Die meeste vrae vereis dat u u keuse moet maak deur met 'n regmerkie u keuse aan te dui, ander vereis dat u 'n toekenning tussen 1 en 5 moet maak en ander versoek dat u 'n persentasie toekenning per item moet maak (in lg. geval moet u net verseker dat hierdie totaal 100% beslaan). Let wel dat in alle vrae waar 'n lys van sektore, leerterreine, ens., gevind word, is die lys in Engelse alfabetiese rangorder geplaas.

- Ons gaan na **bevoegdhede** (competencies) of **vaardighede** (skills) verwys as eenderse begrippe. Die betekenis sal dan wees "enigiets wat u wel kan wys wat u ken en wat u kan doen". Hierdie word deur die Suid Afrikaanse Kwalifikasie Owerheid as **uitkomstes** gedefinieer.

- Ek wil u graag verseker dat die beantwoording van die vraelys vertroulik is. Sou daar vrae wees wat u eerder nie wil beantwoord nie, moet u gerus na die volgende vraag toe oorgaan. Wees ook asseblief openhartig. U mag natuurlik kommentaar lewer op enige aspek wat betrekking het op die opleiding van tuinboukundiges. Sou dit nodig wees, gebruik asseblief addisionele bladsye.

VERDERE HULP

Sou u belangstel om met verdere ondersoeke betrokke te raak t.o.v. of die opleiding van tuinboukundiges of tuinboukundige personeel, dui asseblief dienooreenkomstig hieronder aan:

1. Tuinboukundig

JA	NEE

2. Tuinboukundige personeel

JA	NEE

3. Ander:.....
(spesifiseer)

AANWYSINGS VIR DIE TERUGBESORGING VAN DIE VRAELYS

U word vriendelik versoek om die vraelys aan Mnr Mike Young terug te besorg op enige van die volgende wyses:

Faks aan: (021) 460 3193
E-pos aan: myoung@ctech.ac.za (Hierdie is die maklikste, u kan die vraelys op u rekenaar beantwoord en daarna aan my e-pos)

Pos aan: Departement van Tuinbouwetenskappe
Kaapse Technikon
Posbus 652
Kaapstad
8000

U KONTAKBESONDERHEDE

Dui asseblief hieronder u kontak besonderhede aan. Hierdie word slegs vir navorsings/rekord doeleiendes benodig, maar u voltooiing daarvan is nog steeds vrywillig. U word weereens van die vertroulikheid hiervan verseker:

Voorletters, van en titel: .....

Tel no: .....

Alternatiewe tel no: .....

Faks no: .....

E-pos: .....

Pos adres: .....

.....

.....

Waar is u in diens? .....

Posisie: .....

AFDELING A: ALGEMEEN EN BIOGRAFIES

1. Dui asseblief aan ten opsigte van u maatskappy/instelling:
a) die **sektore van die bedryf** waarin u maatskappy/instelling werksaam is;
b) hoeveel **tuinboukundiges** werk in elk van die sektore [d.w.s. beide die wat gekwalifiseerd is, asook diegene wie as tuinboukundiges praktiseer (op hul ervaring geskoei)]

SEKTORE	(✓) Sektore waarin u maatskappy/instelling werksaam is	Dui die hoeveelheid tuinboukund-iges in elke sektor aan
GEMEENSKAPSTUINBOU		
BOOMTEELT		
BLOMMEKWEEK		
LANDSKAP		
KWEKERY - KLEINHANDEL		
KWEKERY - PRODUKSIE		
BAANGRAS		
ANDER(spesifiseer):.....		

HERINNERING AAN AANWYSINGS t.o.v. VOLTOOIING VIR MAATSKAPPYE/INSTELLINGS: SAL U ASSEBLIEF SORG DAT TEN MINSTE EEN TUINBOUKUNDIGE VIR ELKE SEKTOR WAARIN U MAATSKAPPY/INSTELLING WERKSAAM IS, DIE GELEENTHEID GEGUN WORD OM HIERDIE VRAELYS TE VOLTOOI

2. Dui asseblief aan in watter sektor u tans **hoofsaaklik werksaam** is (kies slegs een):

SEKTORE	(✓) Waar hoofsaaklik werksaam
GEMEENSKAPSTUINBOU	
BOOMTEELT	

BLOMMEKWEEK	
LANDSKAP	
KWEKERY - KLEINHANDEL	
KWEKERY - PRODUKSIE	
BAANGRAS	
ANDER(spesifiseer):.....	

3. Word **indiensopleiding programme** (bv. 'n rekenaar kursus) deur u maatskappy/instelling aan tuinboukundiges verskaf (d.w.s. nie dag-tot-dag opleiding deur toesighouers nie, ook nie opleiding van studente nie) ?

Dui asseblief aan:

JA	**NEE**

Indien **NEE**, gaan asseblief na vraag 4
Indien **JA**, dui asseblief watter onderwerpe of gebiede van opleiding tuinboukundiges aan blootgestel word:

ONDERWERPE OF GEBIEDE VAN OPLEIDING	(✓) Waar van toepassing
Arbeid en verwante aspekte	
Bemarking/openbare betrekkinge	
Bestuur	
Entrepreneursskap/handel	
Interpersoonlike vaardighede	
Kommunikasie	
Masjienerie/toerusting	
Pes-, onkruid- en siekte-beheer	
Rekenaarvaardighede	
Tuinboukundig	

Wetgewing	
Ander (spesifiseer):	

4. Dui asseblief u **kwalifikasies** (asook kort-kursusse) verkry onder elk van die sektore hieronder gelys aan:

SEKTORE	Kwalifikasies(ook waar verwerf)	Wanneer verwerf
BAANGRAS		
BLOMMEKWEEK		
BOOMTEELT		
GEMEENSKAPSTUINBOU		
KWEKERY - KLEINHANDEL		
KWEKERY - PRODUKSIE		
LANDSKAP		
ANDER(spesifiseer).....		

5. Dui asseblief aan die **hoeveelheid jare ondervinding** wat u in elke sektor opgedoen het ongeag of u gelyktydig in meer as een sektor gewerk het:

SEKTORE	Jare ondervinding	Waar in diens
BAANGRAS		
BLOMMEKWEEK		
BOOMTEELT		
GEMEENSKAPSTUIN-BOU		
KWEKERY - KLEINHANDEL		
KWEKERY - PRODUKSIE		
LANDSKAP		

ANDER (spesifiseer):.....		

6. Dui asseblief t.o.v. u huidige pos die **breë indeling van verantwoordelikhede** in terme van a) tuinbou verwante, b) bestuurs/administratief, of c) ander.

BREË TIPES VERANTWOORDELIKHEID	Indeling van verantwoordelikhede ten opsigte van waar u die meeste van u tyd spandeer (as 'n %)
a. Tuinbouverwante	
b. Bestuurs/administratief	
c. Ander (spesifiseer):.....	
	100%

7. Stel asseblief 'n **gepaste naam** voor vir 'n tuinboukundige wat in u sektor werksaam is (bv. Blommekweek tuinboukundige = Blomkweker):

a) naam van u sektor: .....
b) voorstel vir naam vir tuinboukundige:

.....

AFDELING B: IDENTIFIKASIE VAN BEVOEGDHEDE/VAARDIGHEDE

8. Tydens Fase 1 van hierdie navorsingsprojek is fokusgroepe vir elke sektor gebruik om die onderstaande **leerterreine (d.w.s. groepe bevoegdhede of vaardighede)** te identifiseer wat die pligte van 'n gekwalifiseerde tuinboukundige (met of 'n diploma of graad) werksaam in daardie sektor, verteenwoordig. U hulp word in hierdie vraag benodig om vir 'n student wat vir 'n loopbaan in u sektor wil studeer, 'n indeling van tyd te maak ten opsigte van die verskillende leerterreine:

a) Dui asseblief vir alle sektore waarin u blootstelling al gehad het (d.w.s. of 'n kwalifikasie of ervaring), 'n persentasiegewig as indeling van tyd aan vir elke leerterrein van die betrokke sektor. U mag ook ander leerterreine onder ander byvoeg as u sou wou;
b) Dui (na u mening) aan met hoeveel sukses gekwalifiseerdes onmiddelik na voltooiing van hul formele opleiding vir die verskillende leerterreine voorberei is.

LYS VAN GEÏDENTIFISEERDE LEERTERREINE	a) % Toekenning aan leerterreine	b) Met hoeveel suksus is gekwalifiseerdes voorberei? 1=Nie voorberei 2=Swak voorberei 3=Voldoende voorberei 4=Goed voorberei 5=Baie goed voorberei
8.1 Gemeenskapstuinbou		
Gemeenskapsrekreasie		
Omgewingsbestuur		
Tuinbou		
Landskap		
Bestuur		
Ander(spesifiseer):.....		
	100%	

8.2 Boomteelt		
Boomteelt en die wet		
Boomteelt vaardighede		
Opvoeding/opleiding		
Omgewingsbestuur		
Bestuur		
Ander(spesifiseer):.....		
	100%	

8.3 Blommekweek		
Kommunikasie		
Ekonomie en bemarking		
Oes en na-oes		
Bestuur		
Peste, onkruid en siekte bestuur		
Plant kennis		
Tegnies/toerusting/strukture		
Ander(spesifiseer):.....		
	100%	

8.4 Landskap		
Kommunikasie		
Toerusting (logistiek)		
Tuinbou		

Besproeiing		
Landskapontwerp		
Landskapkonstruksie		
Bestuur		
Ander(spesifiseer):.....		

100%

8.5 Kwekery-kleinhandel		
Kommunikasie		
Omgewingsbestuur		
Landskap		
Bestuur		
Plant kennis		
Pes-, onkruid- en siektebestuur		
Kleinhandel		
Grondkunde		
Ander(spesifiseer):.....		

100%

8.6 Kwekery-produksie		
Kommunikasie		
Kweek/verbouing		
Besproeiing		
Bestuur		

Bemarking		
Kwekery ontwikkeling en onderhoud		
Pes-, onkruid- en siektebestuur		
Plant kennis		
Voortplanting		
Ander(spesifiseer):.....		

100%

8.7 Baangras		
Kweek/verbouingspraktyke		
Konstruksie		
Omgewingsbestuur		
Besproeiing		
Bestuur		
Meganisasie		
Pes-, onkruid en siekte bestuur		
Grondkunde		
Ander(spesifiseer):.....		

100%

Opmerkings:

.....

.....

.....

9. Hierdie vraag is 'n opvolg van Vraag 7 en het ten doel om **spesifieke of detail bevoeghede/vaardighede** te identifiseer. U word versoek om vir elk van die leerterreine (bv. Kommunikasie) van u betrokke sektor, 5 to 7 spesifieke bevoegdhede/vaardighede aan te dui(bv. skryf van 'n verslag of openbare optrede) wat u as belangrik beskou.

a) Naam van u spesifieke sektor(bv.Boomteelt):.....

b) Plaas die name van u sektor se leerterreine by die hoofnommers op die tabel [bv. 1) Bestuur, 2) Boomteelt en die wet]

c) Noem 5 tot 7 belangrike spesifieke of detail bevoegdhede/vaardighede vir elke leerterrein:

[Sou u 'n tweede of derde sektor wil beskryf, skryf hierdie asseblief op 'n aparte vel.]

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10. Tydens Fase 1 van hierdie projek is die volgende breë **eienskappe (d.w.s. kenmerkende kwaliteite)** geïdentifiseer wat 'n werkgewer graag sou verkies met die indiensneming van 'n tuinboukundige. Dui asseblief u keuse in die kolomme hierna op 'n skaal van 1 - 5 aan;

a) hoe **belangrik** beskou u elk van die gelyste eienskappe te wees; en

b) hoe goed dink u **presteer** gekwalifiseerdes in die algemeen met die bereiking van hierdie eienskappe?

EIENSKAPPE (d.w.s. kenmerkende kwaliteite)	a) **Belangrikheid**: Ken punte toe van 1 - 5 1=Geen belangrikheid 2=Lae belangrikheid 3=Gemiddelde belangrikheid 4=Redelike belangrikheid 5=Uiterse belangrikheid	b) **Prestasie**: Ken punte toe van 1 - 5 1=Geen prestasie 2=Lae prestasie 3=Gemiddelde prestasie 4=Goeie prestasie 5=Baie goeie prestasie
Sakevaardighede (asook professionaliteit)		
Toewyding (verantwoordelikheid, hardwerkend, akkuraat, ens.)		
Kommunikasie en rekenaargeletterdheid		
Kreatiwiteit (ook innoverende denke)		
Inisiatief (ondernemingsgees, self-gemotiveerdheid)		
Integriteit (eerlikheid, opregtheid, werketiek)		

Interpersoonlike verhoudinge (mensvaardighede, ook met personeel en kliënte)		
Leierskapvaardighede		
Bestuursvaardighede (ook beplanning en organisering)		
Passie vir plante en die omgewing		
Persoonlike groei, ontwikkeling en self-vertroue		
Plantbestuur (alles rakende versorging en hantering van plante) en tegniese vaardighede		
Probleemoplossing		
Gewilligheid om te leer asook vermoeë om te leer		

11. Indien u 'n **kursus** moet saamstel vir studente wat vir 'n loopbaan in u sektor wil kwalifiseer, dui aan hoe u die persentasie tyd deelname (tussen u sektor en die ander sektore) sou verdeel: (Dui die verdeling van tyd as % syfers aan. Alhoewel die % syfer uit 'n totaal van 100% moet bestaan, mag u bv. 100% aan u sektor toewys indien u van mening is dat die student ten volle gespesialiseerd moet wees.)

SEKTORE	Dui sektor aan	Dui % tyd in kursus vir elke sektor
GEMEENSKAPSTUINBOU		
BOOMTEELT		
BLOMMEKWEEK		
LANDSKAP		
KWEKERY - KLEINHANDEL		
KWEKERY - PRODUKSIE		
BAANGRAS		
ANDER (spesifiseer):.....		
		100%

12. Veronderstel dat 'n tuinboukundige, vir meer as twee jaar al gekwalifiseerd is en in u sektor werksaam is, hoe sou u sy/haar **verantwoordelikhede** in breë terme onderverdeel:

BREË TIPES VERANTWOORDELIKHEDE	Na 2 jaar (%)	Na 5 jaar (%)	Na 10 Jaar (%)
Tuinboukundig			
Bestuur/Administratief			
Ander(spesifiseer):.....			
	100%	100%	100%

13. Gebruik asseblief die spasie hieronder om enige ander **aanbevelings** t.o.v. die opleiding van tuinboukundiges te maak:

.....

.....

.....

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14. ANDER OPMERKINGS

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Dankie vir u goedgunstelike samewerking

APPENDIX 5.1

SUMMARY OF AGGREGATED RESPONSES OF FOCUS GROUPS PER SECTOR

SUMMARIES OF CORE (i.e. Fields of learning) AND SPECIFIC SKILLS/ COMPETENCIES PER SECTOR (SHOWING AN ESTIMATED AGGREGATION OF FIELDS OF LEARNING PER SECTOR) (Question 6 - 7)

APPENDIX 5.1.1: AMENITY HORTICULTURE

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)				
	1 Management 24%	2 Horticulture 19%	3 Plant knowledge 15%	4 Communication 12%
SPECIFIC SKILLS (no sequence)	Structures of government Political influences General management (planning, organising, leading, controlling) Strategic thinking Financial management Strategic/process thinking Financial sources (business approach) Human resources management Performance appraisals Industrial relations/conflict handling Safety Resources/assets management/record- keeping Public relations Marketing Procurement/purchasing management Project management/scheduling/ time management Computer applications Skills development/training (staff and community volunteers) Decision-making, problem solving Continuing Professional Development (CPD) Cemeteries and crematorium management	Nursery management range from basic propagation, operation as holding nursery to NBI nursery practices Arboriculture (affinity, basic pruning, felling, plantings, fertilisation, tree surgery, irrigation, equipment, safety, training, waste recycling) Turfgrass management (sportsfield construction and maintenance, also bowling greens and turf cricket pitches) Irrigation (more than basic expertise) Soil mediums/fertilisation/organic growing Pests, disease and weed management Drainage Equipment, vehicles, tools used in horticulture (use and maintenance) General maintenance of gardens and landscapes (hard and soft) Community horticulture Urban agriculture/vegetable growing Safety	Botany (basic) Plant identification Origin of species Plant types Families (taxonomy) Plant characteristics/traits Growth habits (positive and negative) Growth requirements (including soil, shade, fertilisation, pruning) Specific requirements for specific plants Use /application of plants/ species Use indigenous vs. exotic Availability Artistic/design capacity Problems (aliens, invasive, roots, fruits, etc.) Economic value	Listening skills/empathy Communication skills (verbal and written) Press releases Telephone skills Public speaking People skills Communicating with councillors/public/staff Liaison with stakeholder bodies Diplomacy (negotiation skills/client relations) Conflict resolution Protocol in local government Assertiveness Presentation skills Language barriers/ culture issues Interviewing skills/ counselling Computer literacy Meeting procedures Training Networking structures

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)				
	5 Landscape 8%	5 Environmental management 8%	7 Community recreation 7%	7 Contracts management 7%
SPECIFIC SKILLS (no sequence)	Urban and spatial planning (town planning, open space planing, urban renewal) Landscape planning (history, principles, design, drawing, hard vs. soft, recreational and other amenities) Determination of client and public needs/public participation/volunteerism Environmental parameters Designing with plants/plant knowledge/sustainability Site assessment Landscape survey Development of parks (earth-works, establishment) Drainage Irrigation Community gardens/urban agriculture Cemeteries and crematorium landscape planning Indoor landscaping Project management/ scheduling Costing	Ecology Climate Soil properties Conservation principles (eg. water-saving technologies) Legislation Optimal use of land/sustainability Environmental impact assessments (EIAs) Identification of possible conservation areas (range of protection/conservation) Use of indigenous materials vs. exotic Use of non-invasive species Eradication of alien vegetation/invaders/weeds/biological control Responsible use of pesticides Education of staff and public (recycling, biodegradable products, sustainability)	Community recreation philosophy Group dynamics/ communication Partnerships (eg.sports boards, schools, private sector) Public participation projects Volunteerism Facilitation (staff and public) Sustainability of projects Environmental issues/education/skills development Needs assessment Project planning Recreation program/event planning and implementation Sponsorships Marketing/promotion Leasing of facilities Community gardening/ allotments/vegetable gardening/permaculture	Contracts (outsourcing) vs. in-house construction/ maintenance Financial strategies/budgets Project/business plan Planning, organising, scheduling contracts Tender procedures Preparation of specifications Quotations/costing Appointment of consultants Quality assurance/site inspection Entrepreneurship (basics)

APPENDIX 5.1.2: ARBORICULTURE

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)				
	1 Arboricultural skills 36%	Arboriculture skills (continued)	2 Management 26%	3 Education/training 16%
SPECIFIC SKILLS (no sequence)	**1.1 Arboriculture - Biology** History of landscaping and arboriculture Propagation/grafting/breeding Tree biology Knowledge of trees/tree identification Role of trees in landscape/right tree in right place Understand process of rotting Tree assessment in general/vigour/fertilizer and other requirements **1.2 Arboriculture - Technical** Diagnostic skills/hazard assessment/know how much to prune/reading the tree=s problem Tree surgery Construction Tree planting procedures Transplanting procedures Standards in quality of young trees	Fertilization Machinery and occupational equipment (chainsaws, vehicles, chippers, grinders) Pest and disease management and control/calibration/ spraying Climbing skills Rope work, understanding physics Safety, also aerial rescues Overhead cables/powerlines Drawing up specifications for tree preservation Physically able Valuation of trees (replacement costs of loss)	Planning Production planning Project management Labour management/working in teams/training Sales management Contract management/tender documents Communication Public/customer relations, people skills Computer literacy Problem solving Record keeping	Interest and education (own education, staff training and public education) Public education (usefulness and value of trees, planting, caring for trees pruning, etc.) Safety (OHS Act/ rescues/traffic control on roads/staff and public protection) Staff training (safety, tree biology, ropework, pruning, cavities) Conservation ethic, water-saving methods Promotion (eg. Arbor Day) Alien and invader trees (recognition and control) Research problems (identification, eg. sterilisation of problem trees, soil preferences, breeding)

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)		
	4 Environmental 14%	5 Arboriculture and the law 8%
SPECIFIC SKILLS (no sequence)	Macro and micro environment Holistic approach, role of trees in landscape/ecology/permanence Climate (macro, meso and micro climate)/orientation and sun burn Soil science	Litigation-general Legal aspects, branches and roots on boundaries, powerlines and underground services Public liability claims Liability insurance Record keeping in case of claims Tree evaluations (monetary values)

APPENDIX 5.1.3: FLORICULTURE

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)				
	1 Plant knowledge 35%	2 Management 14%	3 Soil science 13%	4 Economic and marketing 10%
SPECIFIC SKILLS (no sequence)	Plant anatomy and physiology (basic)/understand work of hormones/propagation Taxonomy (basic) Climatology (influence of climate on plant growth) Life cycles of important crops/factors influencing crop growth/cycles of production of cut flowers vs.bulbs Sourcing, propagation, mother stock management Cultivation techniques (applied, with examples) Crop care (pest and disease control, growth, fertilization and irrigation) Pruning techniques (for cutflowers vs.bulbs) Usage/treatment/man- ipulation techniques (eg: Chrysanthemums as cut flowers as opposed to potted)/ hormonal treatment	Basic management principles (planning organising, leading and controlling) Basic financial skills budgeting, analysis of reports, accountancy Entrepreneurial skills General strategic management Production management Operational management/scheduling Labour relations/labour law/conditions of employment/conflict resolution/team building Creativity/initiative in business and management Basic office administration	Soil characteristics - water holding capacities/soil root relationships Mineral nutrition and fertilisation Growing mediums/soil additives Sterilisation Soil tests Drainage Managing water quality (composition, ph, etc.) Irrigation/soil moisture control Hydroponics Compost-making (organic) Container environments	Economics of floriculture industry Financial aspects Market analysis/location of markets - local and international Marketing (advertising, promotion, product development, packages) Innovation in marketing Sales management

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)				
	5 Pests, weeds and diseases 8%	6 Harvesting & post-harvesting 7%	6 Technical knowledge 7%	8 Communication skills 6%
SPECIFIC SKILLS (no sequence)	Identification/damage to crops Life cycles Sanitation Control (including integrated and biological) Legal issues Safety (eg. spills), clothing, storage)	Harvesting techniques Post-harvest techniques (on site, storage, transit, at point of sale) Treatment according to type of material Grading and quality control (standards/specification) Logistics from growing site to point of sale (relation to particular crops, transport, storage, temperatures, time delays etc.) Vase life enhancement techniques/materials	Understanding basics of technicalities (ability to talk to experts) Mechanical, computerised and other methods of environmental control Structures greenhouse management Control equipment Heating, cooling, ventilation Electricity (basics) Tractors/vehicles Equipment/implements/tools Equipment/implements Handling systems Transport systems Irrigation systems	Computer literacy Verbal and written skills of communication Presentation skills People skills/working with people Confidence with/handling clients/staff Feedback to superiors/clients

APPENDIX 5.1.4: LANDSCAPE

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)				
	1 Horticulture 29%	2 Management 18%	3 Landscape construction 16%	4 Landscape design 14%
SPECIFIC SKILLS (no sequence)	Knowing and using plants Plant growth requirements Climate Soil Science Fertilisation Environmental techniques Irrigation/watering requirements Drainage Propagation/growing Turf management Arboriculture Tree planting, staking, mulching Pruning Pests/weeds/disease management Maintenance (also levels of) of landscapes Skills and standards (eg. tree hole preparation) Safety	Principles of management Planning Organising Financing Entrepreneurship Business plans Human resource management (also contract staff) Staff reviews/disciplinary hearings Training/skills development Leading Industrial relations Controlling Marketing Public relations Information technology/computers Environmental regulations Legislation Safety Contracts management Project management Procurement management Tender procedures Insurance Office administration Networking/professional development	Design interpretation Planning process/scheduling Site management Survey Earthworks Drainage Irrigation installation Lighting Hard landscaping Soft landscaping Environmental issues Costing and documentation Machinery/equipment on site Contingencies Snagging Safety	History of landscape architechture Design process (brief, site analysis, constraints, survey, plan) Drawing/graphic skills/plan literacy and interpretation Principles of design/ composition/creation of experience Technical design (eg. construction) Meeting client=s needs Budget restraints Presentation of plans Plant selection/ compatibility/ plant plans Materials knowledge Hard vs. soft landscaping Designing for sustainability Design for feasibility/practicality Environmental issues Quantification of requirements Costing and documentation

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)			
	5 Communication 9%	6 Equipment (logistics) 8%	7 Irrigation 6%
SPECIFIC SKILLS (no sequence)	Listening skills/empathy/clarity Verbal and written skills (including telephone) Drawing/sketching as communication People skills Diplomacy/negotiation skills/client relations Assertiveness Marketing Presentation skills Language barriers/culture issues Interviewing skills Computer literacy Meeting procedures Training	General understanding/principles of petrol and diesel engines, hydraulics, etc. Available tools, equipment and vehicles and their applications and operation Purchasing vs. leasing Productivity management Maintenance and servicing Basic building and fencing skills Trouble-shooting Controls (storage, licencing, record-keeping) Environmental issues Basic workshop skills, repairs, welding, sharpening, hygiene, etc. Materials use and management Safety, also legislation	Irrigation principles Climatic influences Soil characteristics Site restraints Water sources/quality Re-cycling water Irrigation systems/controllers/products available Irrigation design Trouble-shooting Maintenance of systems Environmental issues Surfactants Legislation

APPENDIX 5.1.5: NURSERY PRODUCTION

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)				
	1 Management 21%	2 Propagation 14%	3 Plant knowledge 12%	3 Cultivation/growing 12%
SPECIFIC SKILLS (no sequence)	Vision and mission Ethics Production planning (market survey, identify stock range, quantities, scheduling, payout and time frame, costing and budgeting, materials ordering and distribution) Planning (yearly, daily) Productivity Financial planning costing concepts, tax, budgeting, quoting, tendering, reconciliation, discounting and purchases, accounts, environment)) Sales co-ordination and delivery schedules Organisational skills, delegation, co-ordination Labour law (conflict management, grievance and disciplinary procedures, legislation, union, etc.) Human resources management (recruitment to salaries, conditions of service, contracts, job descriptions, evaluation, etc.) Supervisory skills (leadership, staff motivation, groups team-playing, learn from labourers, skills training, conflict resolution Office administration and record-keeping Safety Stock control	Propagation techniques (sexual, vegetative, seasonal scheduling, tissue culture) Plant varieties are their propagation requirements Environmental control techniques (micro climates, mist, temperature, ventilation floor heating Technology (sowing machines, plug machines, germination rooms, tissue flow apparatus) Soil mixes for sowing, cuttings, potting-up, problem plants (composts, soil, additives, fertilizers etc.) Stock plant manipulation (cutting back, maintenance) Hardening-off ares Pest and disease control Sanitation Safety Monitoring Timing	Plant identification, also new varieties Plant characteristics and applications Growth requirements (soils, fertilisers, sun and shade, water-wise, climate and environmental preferences, pest and disease susceptibility and resistance) Sale value of plants/ marketability (economic value)/viability (in region, eg. to different microclimates) Legislation (legal aspects of alien plants, trademarking, Plant Breeder=s Rights) Research (new varieties, breeding, soil mixers, growth accelerations, rooting hormones, etc.) Creative/artistic skills in application of plants in gardens/landscape	Media (base materials, mixes, additives) Plant preferences in optimal media Fertiliser requirements of plant material Selection of containers Spraying programmes (preventative) Potting-on programme Pruning, stabing and plant Afinishing@ to salable products Pest control (Identification, best control methods, also biological) Pest prevention methods Line production (from decision to propagate, forecasts, budgets to presentation of the final product)

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)			
	5 Marketing 10%	5 Pests, weeds and disease management 10%	7 Communication 8%
SPECIFIC SKILLS (no sequence)	Psychology/philosophy Identification of markets, niches Market research Flexibility, where and when to market Co-operative marketing Distribution (also via plant brokers) Cross merchandising (linking products) Budgeting/costing Product and product range Branding, labels, correct nomenclature Merchandising, presentation, selling Advertising media (telesales, faxes, e-mails, website, etc.) After sales care/customer care/quality control/customer satisfaction Transport, delivery, distribution, techniques/ channels, truck size	Knowledge of pests (identification, life cycles, crop damage, thresholds, environmental condition favouring outbreaks, etc.) Environmental issues (safety, regulations) Disease, weeds and pest control measures (chemical vs. biological) Product knowledge (what to use, when, reading and understanding labels, toxicity levels) Communication/liaison/extension on spreading pests Calibration Maintenance and servicing of spray equipment Intergrated control Preventative measures Sanitation Safety (OHS Act, regulations, safety, representatives, first aid, clothing, disposal of containers, licensing to spray, training, etc.	Internal communication (staff interaction, interest in staff, feedback on jobs done) External communication (other growers, retailers and public) Computer skills (word processor, spreadsheets, payroll environment, database accounts environment, web, internet, e-mail, viruses) Letters, reports, other written communication Meetings and meeting procedure Presentation skill, public speaking Training - ABET courses in literacy and numeracy Xhosa Sharing of ideas Continuing professional development (upgrading knowledge, attending seminars)

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)			
	7 Nursery development and maintenance 8%	7 Nursery development and maintenance (continued)	9 Irrigation 5%
SPECIFIC SKILLS (no sequence)	Needs determination (what requirements, present and future) Construction planning Products and materials knowledge/ latest technology/ specialised requirements Choosing a site, orientation, resources, infrastructure Budgets, costing, pricing Building requirements Layouts/flow chart Drainage Irrigation systems (types, installation, water sources, quality of water, fertigators) Computer and other environmental control mechanisms Pumps Propagation facilities Proximity raw materials (water, soil, etc.) Storage for chemicals, tools, etc.)	Stock plants Pest management Hygiene/sanitation Maintenance of buildings, tractors, machinery, equipment, servicing, etc./ electrical, mechanical skills Other equipment, vehicles, tractors, etc. (requirements and maintenance) Maintenance of roads, drainage channels, etc. Outsourcing certain functions, eg. spraying Security	Water sources (storage, riverine law, quality, etc.) Pump systems Controllers Materials (sizing, grading) Filters Hydraulics (concepts only) Calculation of plant water requirements (tolerance) Optimal irrigation times/ day or night Basic repairs Fault-finding Water saving

APPENDIX 5.1.6: NURSERY RETAIL

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)				
	1 Plant knowledge 23%	2 Retail management 20%	3 Management 15%	4 Plant protection 13%
SPECIFIC SKILLS (no sequence)	Botany (basics) Plant identification Nomenclature Plant characteristics Applications Indigenous plantings Water requirements of plants\ irrigation Influence of climate, ecology and soils on growth patterns Fertilisation Alien vegetation/invaders/ regulations Diagnostic skills (answering client queries) Problem plants (roots, fruit and other structures) Propagation (basics)	Retailing Marketing Meeting consumer needs Customer dynamics Salesmanship Selling aptitude/skill Merchandising, displays Advertising Stock ratios/mixing Product knowledge (also related products) Purchasing/buying/timing Negotiation Financial management/ pricing Costing (retail accounting) Communication in retailing Computerisation Organisational dynamics Nursery layout Promotion of horticulture	Management philosophy (Schools of management) Business management/ organisation/planning/control Financial management Economics of trading with plants Accounting (profit margins etc. Legislation (contracts, business law, documents and labour law) Human resources management (including labour law, conditions of employment, etc.) People skills (staff and clients)/negotiation Computers in business Time management Stock control Safety, first aid Administrative procedures (tills, information desks, telephone use, queries, etc.)	Entomology (basics) Diseases Pests Weeds Diagnostic skills Control Products Spraying/calibration Disposal of containers

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)				
	5 Communication 10%	6 Soil science 8%	7 Environmental 6%	8 Landscape 5%
SPECIFIC SKILLS (no sequence)	Listening skills Communication skills (verbal and written) Telephone skills People skills/client problems Public speaking Communication with customers/staff Personal selling skills Negotiation skills Language: Xhosa Meeting procedures Information retrieval Computer literacy Internet/e-mail etiquette Assertiveness/confidence building	Geology (basics) Soil types, origins Soil characteristics pH Soil nutrients Soil analysis Water quality Soil water retention capacities Media Products Fertilisers Organic materials/ composts, etc. Mulching	Climatology (SA), macro-, meso- and microclimates Eco-systems, regions in the country Ecology (include soils, plants, animals, insects, etc.) Principles of conservation/water-wise landscaping Techniques (eg. mulching)	Landscape design (basic) Drawing skills (basic) Architecture and complementary landscapes Landscape construction (basics) Landscape advisory/consultancy service only Differences hard vs. soft landscaping Hard landscaping products Irrigation products (residential vs. commercial) Quantity surveying Nursery displays Machinery/equipment utilisation

APPENDIX 5.1.7: TURF

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)				
	1 Management 20%	1 Management (continued)	2 Agronomy 19 %	2 Agronomy (continued)
SPECIFIC SKILLS (no sequence)	Communication (committees, meetings, telephone, electronic, verbal and written) Cultural awareness Public relations Policy formulation Planning and implementing Project planning Operational planning Business economics Budgeting, financial, management, sponsorships Purchasing capital, material and equipment items Organisational skills, delegation, motivation Industrial relations, laws disciplinary procedures, job descriptions, etc. Staff training (in equipment use and maintenance, tree and shrub care, landscape development, etc.) Human resources management, recruitment to salary administration Marketing/usage management Computer skills (word-processor, database, spreadsheet, internet, irrigation operating systems, basic CAD, trouble shooting) Facilities management Facilities design	Sports administration Recreation/understand needs Course set-up (eg. pin placement, grounds under repair) Stores inventory and management Record-keeping Safety legislation, procedures, first aid Safety (staff and visitors) Conflict management Control methods	Plant knowledge Plant physiology Plant selection Botany Application of plant to a range of sites, eg. wetlands Indigenous plants use Propagation basics Landscape planning Beautification of environment Knowledge of grass types (characteristics, applications, growth requirements, propagation, water requirements) Relationship grasses to environment (endemic grasses) Understand climate, macro, meso, micro and effects on turf Fertilisation (soil science, plant requirements, safety, absorbtion qualities, calibration, rates, composition, calculation of nutrients available, analysis of soil analysis, data foliar and soil applications) Mowing (heights, types maintenance, sharp blades, etc.) Aerification Scarrification Topdressing Grooming Matting Rolling	Colouring Drainage Maintenance of various surfaces (eg. turf pitches) Arboriculture (pruning, planting, transplanting, removals, legislation, aliens, etc.) Safety Training Computer applications

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)			
	3 Irrigation 12%	4 Pests, weeds and disease management 12%	5 Environmental management 10%
SPECIFIC SKILLS (no sequence)	Determining plant requirements Water supply (rivers, dams, etc.) Quality of water (pH, effluent water use, saline water) Water tables, groundwater Wind factor River use, legal and maintenance Hydrology Pipe flows Pumping requirements (topography) Pressure and flows Design Installation Computer automation/control systems Automatic/non automatic systems Pumps/pumphouses Borehole maintenance Electrical installation Pipe and sprinkler types Meters Valves Filters Maintaining systems Dam maintenance CSIR contacts	Identification, symptoms Entomology, life cycles, basic biology Legislation Resistance problems Mechanical equipment and sprayers Biological control (concepts only) Application sales Calibration (from computer operated equipment to knapsack sprayers) Read and understand labels Chemical vs biological control Safety Follow-up assessment skills Effects of cultural practices, e.g. aerification, fertilisation Invader plant control Record-keeping Storage procedures Disposal of containers	Legislation Philosophy/awareness/ education/passion Environmental impact assessment (EIA) Planning Conservation/preservation Environmental management (understand position of turf facilities relative to environment i.e. harmful products, procedures, etc.) Environmental stabilisation techniques (basics) Reclamation Aesthetics Community involvement in projects/education Protection local plant specimens (wildlife included) Aquatic problems (dams, rivers) Knowledge of chemicals

CORE SKILLS/COMPETENCIES (FIELDS OF LEARNING)			
	5 Soil science 10%	7 Mechanisation 9%	8 Construction 8%
SPECIFIC SKILLS (no sequence)	Soil science (properties, types, micro-organisms, water holding capacities, drainage, analysis, soil preparation/additives) Chemistry pH values Structure/texture Drainage techniques Water-holding capacity Density Fertilizers Water requirements per plant species Knowledge of local soils/soil media/changing soil characteristics Effects of cultural practices on soils USGA specifications	Basic engine knowledge/understand basics (eg. rebore) Hydraulics (basics) Electronics (basics) Pumps (basics) Product awareness to turf Purchasing equipment Types of machines/usage Maintenance procedures (servicing, schedules, etc.) Fillers, fuels, lubricants, additives Purchasing equipment Safety, legislation (OHS Act), first aid Starting procedures Sharpening blades/setting/backlapping Loghook keeping Workshop layout, organisation and upgrade Weld/solder Training Computers (including database/ stockkeeping) Preventative maintenance (eg. servicing, records) Troubleshooting Minor repairs Farm mechanics (includes fencing, building structures, roads, etc.) Ability to train operators	Design Planning/scheduling/seasonal variations Soil science/properties Survey Types of equipment Earthmoving Drainage Irrigation Storage top soil Importing soil Stabilisation of earthworks Windbreaks Planting procedures Grass types Types of facilities (greens, wickets, etc.) Dimensions Replacing grasses Irrigation upgrade Tree planting Road repairs Elementary building skills Artificial surfaces Play equipment and structures Swimming pools (recreational)

APPENDIX 6.1

SUMMARY OF SPECIFIC SKILLS/COMPETENCIES

IDENTIFIED BY MAIL SURVEY PER SECTOR

SUMMARIES OF SPECIFIC SKILLS/COMPETENCIES PER FIELD OF LEARNING FOR EACH SECTOR

APPENDIX 6.1.1
SPECIFIC SKILLS/COMPETENCIES PER FIELDS OF LEARNING FOR AMENITY HORTICULTURE

Fields of learning	Fields of learning
COMMUNITY RECREATION Recreation Development of recreation and sports facilities Recreation planning Activity planning Event management Project management Management (4) Staff management Labour relations (1) Budgeting (1) Administration Landscape Mechanisation Communication Public speaking Liaison with public Problem-solving skills Motivated Outgoing/active/alive Leadership skills Friendly attitude/making friends Knowledge of communities/ environment/organisation Project management Computer skills Reports (1) Horticulture Good plant knowledge Irrigation Pests and weed control Maintenance **ENVIRONMENTAL MANAGEMENT** Environmental education Environmental law Environmental Impact Assessments Environmental Management Plan Environmental auditing Environmental control Environmental health Invader plant management Knowledge of Acts Geology	Appreciation of plant cycle/botany Design Socio-economic issues Community development City and regional planning Problem solving Investigative procedure (GIS - Geographic Information Systems) Rehabilitation practice Reports Staff management Communication Administration Computer skills Human resource management **HORTICULTURE** Staff management Budgeting Administration Marketing Computer skills Mechanical skills Responsible Careful Accurate Practical Creative attitude Plant nomenclature (3) Understand plant science Love working with plants Plant knowledge (3) Botanical Pest and weed control (6) (preventative and curative) Turf Horticultural maintenance Propagation/plant production (3) Arboriculture Nursery management Gardening practice Soil science Turf grasses Turf sportsfields Preparation for plans on turf Soils for turf

Fields of learning	Fields of learning
Mechanisation (types, applications, maintenance and settings) Soil science (soils, biological factors and fertilisers) (3) Horticultural research Equipment Irrigation Construction Growth habit Uses of variation **LANDSCAPE** Artistic ability Staff management Creativity Administration Marketing Computer skills Insight Patient Simple Express ideas well Draw well Interpretation of picture Construction skills (4) Communication Horticultural skills Drainage Surveying Irrigation types Automation in irrigation Irrigation costs Design Irrigation **MANAGEMENT** Budgeting/financial (2) Reports (3) Correspondence Human resource management (4) Presentations Administration (3) Computer skills Training Audit standards Task list programmes Basic record keeping Uses of facilities vs workers	Multiple use of resources Labour law Labour and Employment Act Meetings, agenda, minutes Negotiation skills Motivation Communication Control Responsible Careful People skills/interpersonal skills (3) Planning Problem-solving Project management Productivity Time management Planning Records Audit standards Task list programs Work schedules Accurate

APPENDIX 6.1.2
SPECIFIC COMPETENCIES/SKILLS PER FIELDS OF LEARNING FOR ARBORICULTURE

Fields of learning	Fields of learning
ARBORICULTURE AND THE LAW Familiarise on all laws protecting trees Rights of owner Landowner's duties towards trees Rights of community Liabilities of landowners, public and private Responsibility of local councils and authorities Trees and boundaries Measuring damage loss re-evaluation Insurance claims Liabilities of consulting Acting as expert witness in court **ARBORICULTURAL SKILLS** Climbing techniques (2) Pruning techniques (2) Cutting techniques Lifting-ropes Safety Problem diagnoses Tree planting/transplanting Tree biology Tree analysis Planting Irrigation Fertilisers Soil samples Tree identification Nomenclature Principles of identification Terms Soil science Soil and their properties Chemical and biology of soil and plant growth Construction management Specifications for preventing damage Aeration Tree skills Internal work terms	Plant classification Tree selection Nursery stock **EDUCATION AND TRAINING** Education of public Education of landscapes and nurseries **ENVIRONMENTAL MANAGEMENT** Macro-climate Micro-climate Human impact Impact of place History Aesthetic value of trees Tree and site evaluation (2) Repair of poorly growing trees Site considerations Tree considerations Plant placement and uses Cabling and bracing Lightening protection Cable installation Equipment and hardware Limitations and advantages **MANAGEMENT** Organisation and distribution of work Communication Workers/personnel Client skills Client liaison Landscaper liaison Architect liaison Builder liaison How to work with labourers Motivating labourers to work Correct calculation of quotations Business management Mapping/planning Computer skills Networking

APPENDIX 6.1.3
SPECIFIC COMPETENCIES/SKILLS PER FIELDS OF LEARNING FOR FLORICULTURE

Fields of learning	Fields of learning
COMMUNICATION	**MANAGEMENT**
Communication - client/labourer	Hard working
Know how to work with staff	Enthusiasm
Reporting back	Clear instructions
Understanding local workers	Supervision
Labour relations	Discipline
Supervision skills	Receiving co-operation
Motivating	Computer knowledge
Fluent in 2 languages	Productivity of workers
Advertising	Record-keeping of production
Computer skilled e.g. e-mail, internet, Excel, Word	Administration of storage space
	Planning (3)
	Labour budgeting
ECONOMICS AND MARKETING	Implement budgeting
Marketing	Compensation
Promotion shows	Selling an example
Marketing quality	Climate control
Client service	Composition
Corresponding with clients	Spray programme for pesticides
Price structure of products (6)	
Basic economic principles	**PESTS, WEEDS AND DISEASE MANAGEMENT**
Cashflow and budget	Identification of diseases
Accounting	Identification and control
Transportation costs	Knowledge of plant diseases
Interest rates	Knowledge of insects
Exchange rates	Work environment that affects diseases
	Spray programmes
HARVESTING AND POST-HARVESTING	Weed control
Factors that affect harvesting	Knowledge of chemicals
Factors that affect flower life	Knowledge of materials
Shading	Environmental friendly spraying
How to pick	Supervision of application
Handling	Training for "scouts"
Speedy handling	Compatability of pesticides
Test different products	Record keeping
Sterilisation	
Packaging (2)	**PLANT KNOWLEDGE**
Product promotion and presentation	General plant knowledge
Vase life time	Specific flower knowledge
Cold-storage/packaging/transportation	Growing techniques
	Growth needs of specific plants
	Fertilising
	Soil/compost

Fields of learning	Fields of learning
Water Hydroponics Botanical physiology Factors that optimally grow for scent **TECHNICAL/EQUIPMENT/ STRUCTURES** Electric valves and computer system for irrigation and climate control Functioning of pumps Equipment knowledge Irrigation Pad/fan/natural ventilation Water system Nets and plastic Maintenance Different glasshouses Glasshouse structures Pesticide distribution apparatus	

APPENDIX 6.1.4
SPECIFIC COMPETENCIES/SKILLS PER FIELDS OF LEARNING FOR LANDSCAPE

Fields of learning	Fields of learning
COMMUNICATION Verbal communication (2) People skills (2) Personal skills Public speaking (2) Etiquette (2) Group and personal communication Presentations Oral presentations Proposal presentations Verbal skills for meetings Meetings Negotiating Relations with senior management Relations with labour Relations with clients Understanding client needs Human relations Customer relations Dealing with customers Interpersonal relationships Verbal and written aptitude Language Management Reporting Estimating Budgets/accounting Sales techniques Perspectives Punctuality Project management Doing more than is expected Teamwork and motivation of team members Knowledge of focus Graphics Models Advertising Trade terms Customers as workers Contracts Labour relations Outsourcing work Site meetings Site safety	Bill of quantities Computers Computer literacy Electronic communication (2) E-mail Microsoft Word Microsoft Excel Writing letters Writing reports Distribution of documents Language used for letters, fax Documenting/reporting Quotations Computer literacy Quotes (2) Business letters and memorandums Plant knowledge **EQUIPMENT (LOGISTICS)** Different machines for different finishes Types of machinery e.g. loaders to weedeaters Using mowers, brush cutters and chainsaws (5) Right equipment choice Survey equipment Basic machinery - landscaping Landscape equipment Soil cultivation machines Spray equipment What to use where Knowledge - know how Practical experience Training of personnel Operating manuals Being able to instruct someone Operations Modes of operations Operational skills Operational use Cost of time with equipment Productivity Safety Detect faults Oil mixtures Safety and pollution (2)

Fields of learning	Fields of learning
Basic working and basic repairs (2) Maintenance Maintenance manuals (2) Maintenance of equipment Computer literacy (2) Irrigation Fertilisers **HORTICULTURAL** Propagation (2) Plant knowledge (5) Soil mediums Diseases Pests Weeds Pruning (4) Sowing methods Planting methods Propagation methods (2) Scientific data Classification Problem-solving Trouble-shooting Soil science Transplanting Division of plant material Seed sowing Planting techniques Soil mixtures Pruning Maintenance practices Soils and fertilisers Characteristics Plant knowledge - how they grow, what they like and also names Correct use of plants Plant identification (3) Requirements of individual plants Climate and soil Impacts of choice Problem plants/aliens/ indigenous plants Pests and diseases Pruning practices Growth media Organic and inorganic fertilisers (2) Plant care Maintenance practices Site experience Indigenous knowledge	Herbicides and pesticides (2) Turf maintenance Turfgrass identification Turf care Spraying calibration Disease detection Deficiency detection Remedial measures **IRRIGATION** Design (8) Basic layouts Layout Know irrigation components Technical flow specifications Basic hydraulics Available equipment Equipment cost Understanding equipment Costing (3) Automatic/manual systems Specifications for installation Installation (6) Systems Water pressure rates Pressure Water flow rates Calculation of participation rates Maintenance (3) Repairs Costing (3) Productivity Equipment cost Plant design Efficiency Know irrigation components Technical flow specifications Maintenance When to irrigate - day/night Quantity of water per week Installing well points Bill of quantities Introduction to products Product knowledge Students to get additional practical training Computers Public speaking and seminars Introduction to plants Plant requirements

Fields of learning	Fields of learning
Plant design	Design, flair/skills
Product knowledge	Site measurement (2)
Computers	Plan interpretation
Boreholes	Basic aided design
Storage dams/tanks	Styles
	Drawing techniques (2)
LANDSCAPE DESIGN	Site analysis
Themed gardens	Planting plan
Water features	Master plan
Garden layout	Planning, financial aspects
Plant compatibility	Price
Garden grades	Management
Plant compatibility	Quantity list
Principles (3)	Receipts
Elements	Marketing
Procedures and analysis	Computer qualification
Aesthetics	Plan interpretation
Materials	Presentation (3)
History	
Environmental behaviour	**LANDSCAPE CONSTRUCTION**
Design construction	Hard and soft landscaping
SALI- standards	Cement and concrete mixing
Knowledge of plant materials	Foundations
Irrigation	Levelling/constructing
Drawing techniques	Place and position plants
Creativity	Place and position hard landscape elements
Detail drawings	Quantity estimates
Elevation techniques	Pricing
Plant knowledge	More onsite training
Basic design concepts	Training with equipment - hands-on
Execution	More practical training on dam/water feature construction
Design (2)	Labour management (2)
Installation	Contract management
Plant choices/usage	Plan reading
Process for designing	Soil preparation(2)
Functionality (2)	Working with machinery
Graphic communication	Basic irrigation (2)
Creativity	Sub contractor management
Planning design	Contract documentation
Hard landscape design	Planning on-site
Site visualisation	Soil preparation
Artistic development	Building principles
Practical, visually pleasing result	Product knowledge
Graphic symbols	Specific installation techniques
Scope	Horticultural techniques
Content of drawings (3)	Planting
Setting out	Soil preparation
Scale	
Practical knowledge	

Fields of learning	Fields of learning
Fertilisers	Staking of trees
Construction materials (2)	Laying of lawn
Tools	Using of hard materials
Machinery	
Metal work	**MANAGEMENT**
Paving	Labour
Irrigation	Finance
Lighting	Dealing with municipal authorities
Calculations	Clients
Surveying/ mapping	Quotations and administration
Specifications and quantities	Accounting
Costing (2)	Finances
Product knowledge	Marketing (3)
Productivity	People skills (3)
Time- cost- deadlines	Planning
Quality control	Problem solving
Customer satisfaction	Financial background
Methods	Time control (3)
Drainage	Industrial relations
Design	Contract negotiation
Work scheduling	Marketing techniques
Organisational skills	Public relations
How to deal with various materials, e.g. stone pitching, laying drains, rocks	Interpersonal relations
Sequence scheduling	Project management
Species interpretation	Office management
Integration with other disciplines on site	Motivation of workers
Knowledge of general Do-it-yourself	Administration
Practices e.g. paths, steps, pergolas, paving, etc.	Meeting deadlines
Different ideas of each	Delegating
Soft landscaping - plant plans (2)	Cash flow
Hard - landscaping - water features	Job costing
Specifications	Overheads
Quantities	Labour relations
Surveys	Budgeting (2)
Groundworks/grading	Committee relations
Detailed drawings	Business skills
Material knowledge and prices	Profit and loss
Programme schedules	Contracts
Programming	Sub-contracting
Techniques	Bill of quantities (3)
Quantity surveying	Tender procedures
Law	Maximum productivity
Planning	Staff relations
Plant knowledge	Planning
Lease of plants	Leadership
Contracts	Organising
Planting techniques	Controlling
	Computer skills
	Reporting

Fields of learning	Fields of learning
Cost analysis Time management Personal skills Basic bookkeeping and administration Basic labour law (2) Tendering Basic management skills (2) Economics More financial backing Banking (2) Talks with owners/seminars Schedule programmes (2) Consulting	

APPENDIX 6.1.5
SPECIFIC COMPETENCIES/SKILLS PER FIELDS OF LEARNING FOR NURSERY PRODUCTION

Fields of learning	Fields of learning
COMMUNICATION	**IRRIGATION**
Interpersonal skills	Irrigation systems
Productive communication	Systems
Interpersonal communication	Basic knowledge of different types of
Intercultural communication	irrigation systems
Effective and motivating communication	Types of sprayers
Address people	Scientific approach
Public speaking	Installation
Sound public speaking (3)	Installation of pumps
Phone etiquette (2)	Basic knowledge of electronics
Correct channels - up and down	Maintenance (2)
Transparency	Maintenance of pumps
Good labour practice skills	Plant water requirements
Sales and marketing ability	Efficient and effective water application
Computer literacy (2)	Knowledge of soil
Reports (2)	Fertilization knowledge
	Understanding of pruning
CULTIVATION/GROWING	Administration of irrigation control
Plant manipulations	Marketing
Interpretation of problem crops and the	Financial management skills
correct treatment thereof	Sales and marketing skills
Fertilization practices	Entrepreneurial skills
Growth media qualities	Good communication skills
Sound plant knowledge	
Propagation knowledge	**MANAGEMENT**
Knowledge of climatology	Plan/organise/lead/control (2)
Growing requirements	What is control
Growing structures	Planning 1-5 years ahead
Cultivation principles and practices	Supervisory management
Growing media	Management skills
Hygiene and quality (2)	Leadership skills
Maintenance of different plants	Commitment
Transplanting	Good people skills (2)
Pruning	Financial control
Staking	Personnel control
Basic accounting management	Staff relations
Knowledge of financial statements	Staff requirements
Finance (2)	Labour law
Record keeping skills	Stock control
Trade knowledge	Cash flow control
Construction skills	Staff relations
Sound mechanisation knowledge	Staff requirements
Knowledge of material	Customer requirements

Fields of learning	Fields of learning
Basic accounting	Knowledge of pesticides
Advertising	Environmental management
Mathematics	Knowledge of ecological combating
Promotions (2)	Chemical control
Knowledge of plants	Biomedical control
	Pesticides
PLANT KNOWLEDGE	Methods of control (2)
Plant identification	Control management
Knowledge of soil types	General knowledge
Common names and where they can be grown	Understanding lifecycles
	Knowledge of business production
Uses of soil	Alternative production
Exotic plants	Influence on environment
Botanical gardens	Control management
Indigenous plants	How to maintain plants on the floor
General knowledge	
Group knowledge	**RETAILING**
Care of plants in retail nursery	Advertising
Display of plants after 5 years in garden	Merchandising
Basic propagation	Products
Pruning and maintenance	External marketing
Varieties	Internal marketing
Fertilizers	Marginal planning
Light varieties	Setting up computer systems
Soil in specific regions	Pricing
Identification	Power of knowledge
Diagnostic features	Knowledge of rights
Characteristics	Business control
Requirements	Communication
Users	People knowledge
Growth habits	Interpersonal skills
Plant requirements	Marketing
Nomenclature	Product price
Horticulture	Product knowledge
Propagation	Nursery layout
Plant management and technical skills	Effective displaying
Soil science	Chemical factors
Income vs. expenditure	Texture
How to use theory in environment	Lab report analysis
	Crop recommendations
PESTS, WEEDS AND DISEASE MANAGEMENT	Knowledge of soil types (7)
	Plant knowledge
Identification	Turf
Safety	Composts
Management	Soil types - rectify sand and/or soils
Staff requirements	Basic knowledge of growth mixtures
Customer requirements	Nutrients - macro and micro

Fields of learning	Fields of learning
Fertilizer types Soil conditioning What plants for what soil	

APPENDIX 6.1.6
SPECIFIC COMPETENCIES/SKILLS PER FIELDS OF LEARNING FOR NURSERY RETAIL

Fields of learning	Fields of learning
COMMUNICATION	Land reclamation
People skills (2)	Input assessments
Follow up complete (feedback loops)	Passion for the environment
Staff integration	Environmental laws
Memorandums	Applied packages e.g. (Windows, Office)
Instructions	Another language e.g. Xhosa
Reports	Latest research
Tenders	Application in retail-trade (2)
Quotations	Bio-maths
Personal growth	South African cartography
Verbal and writing communication skills	
Writing articles	**LANDSCAPE**
Public speaking	Carpet beds
Communication with subordinates	Hard landscaping
Proposals	Irrigation
Confidence	Basic plans and drawings
Assertiveness	Equipment
Client service	Grouping of plants (2)
Motivate workers	Basic design
Marketing of plants	Presentation of designs
Promotions	Computer applications
Communication with workers (2)	Environmental influence
Communication with clients (2)	Indigenous plants
Negotiation	Latest methods
Effective advertising	Cost calculation
Professionalism	Concepts hard landscaping
People skills	Irrigation
Good plant knowledge	Basic plans and drawing equipment (2)
Ability to convey knowledge	Grouping of plants
Labour law knowledge	Scale/mathematics
	Knowledge of plants (3)
ENVIRONMENTAL MANAGEMENT	Growth habit of plants
Ecological knowledge	Colour groups
Knowledge of pesticide composition	Creativity (3)
Intruder plants	Originality
Contamination	Design
Cultural knowledge	Installation
Conservation of animals and plants	Erosion - prevention
Application in gardens	Legislative aspects
Application in nursery	Construction
Alien vegetation	Measurement
Climate	Survey
Land reclamation	Triangulation
Input assessments	Customer needs
Climate	

Fields of learning	Fields of learning
MANAGEMENT	Identification
Public relations (2)	Diagnostic features
Staff requirements	Characteristics
Customer requirements	Requirements
Plan/organise/lead/control (3)	Users
Supervisory management	Growth habits
Management skills	Plant requirements
Leadership skills	Nomenclature
Commitment	Horticulture
Good people skills	Propagation
Knowledge of plants	Plant management and technical skills
Business supervision	Soil science
Personnel control	
Nursery in general	**PESTS WEEDS AND DISEASE MANAGEMENT**
Labour law	Need to identify
Purchase control	Identification (3)
Stock control (2)	Identification of weeds
Cash flow control	Identification of diseases
Basic accounting management	Identification of pests
Knowledge of annual financial statements	Identification of plagues
Finance (2)	Knowledge of pesticides
Staff relations	Safety control
Basic accounting	Combating
Advertising	Environmental control
Mathematics	Knowledge of ecology
Displays	Chemical control
Promotions	Biomedical control
	Display of plants after 5 years
PLANT KNOWLEDGE	Spray materials
General knowledge	Distribution of spray materials
Group knowledge	Methods of control (2)
How to use it in practise	Understanding lifecycles
Care of plants in retail-trade nursery	General knowledge
Display of plants after 5 years in garden	Knowledge of wholesale products
Botany	Alternative products
Indigenous plants (2)	Impact on environment
Exotic plants	How to maintain plants on the floor
Basic propagation	Control management
Pruning and maintenance	Income vs. expenditure
Plant identification	
Knowledge of characteristics	
Knowledge of soil types	**RETAILING**
Uses of the soil	Products
Common names	Product knowledge
Where they can be grown	Advertising
Varieties	Merchandising
Growth signs	External marketing
Light requirements	Internal marketing
Nature of a specific environment	Effective exhibition

Fields of learning	Fields of learning
Determination of gross margin Internal marketing Effective exhibitions Determination of gross margin Setting up computer systems Pricing Power of knowledge Rights knowledge Business control Communication People skills Interpersonal skills Customer relations Marketing Product price Promotion packaging Staff management Customer management Chemical factors (2) Texture Lab report analysis Crop recommendations Knowledge of soil types (7) Uses of different soil types Plant knowledge Bio-medical knowledge Micro-organisation knowledge Fertilisers Turf Composts Soil types - rectify sand/clay soils Basic knowledge of growth mixtures Nutrients-macro and micro Fertiliser types Soil conditioning Which plants for which area	

APPENDIX 6.1.7
SPECIFIC SKILLS/COMPETENCIES PER FIELDS OF LEARNING FOR TURF

Fields of learning	Fields of learning
AGRONOMY/CULTURAL PRACTICES Identification of grasses Growth patterns/seasonal changes Use of various grasses Responses to damage Relationship of root/leaf development The argument for/against turf monoculture Knowledge of different grass species Know cutting heights Know temperature sensitivity Different grass surfaces Maintenance programme (2) Soil preparation Weed control **CONSTRUCTION** Know the different types of construction Practical Construction of cricket pitches Construction of bowling greens (2) Golf greens Tees Cricket Rugby/soccer/hockey/tennis Drainage (2) **ENVIRONMENTAL MANAGEMENT** Water Ecology Fauna Flora Knowledge of how the work affects the environment Training in environmental stewardship Incorporating bio-diversity Pollution Use of pesticides **IRRIGATION** Know how to design Drawing of plans Lay-out System design	Knowledge of fitting Basic electrical/plumbing skills Equipment Basic principles of hydraulics Hydraulics Know different sprinklers When to irrigate Maintenance Repairs Pump-house principles Pressure Water hammers Water law Application Products/materials Product exposure Agronomy - soil science Turfgrass physiology Turfgrass morphology Turfgrass identification Supplementary cultural practices Computers Relations between evaporation, drainage, species, requirements, management and applications **MANAGEMENT** Motivational skills Organisational skills Personnel Personnel management Communication Know how to motivate people Conflict Work allocation Productivity Budgeting (2) Financial/budgeting People skills Logistic training/project co-ordinating Labour relations

Fields of learning	Fields of learning
How committees function Labour law Labour relations Know labour relations Health and safety issues Administrative procedures Computers Materials control **MECHANISATION** Machines Functioning of machines Different machine knowledge How to operate machines How to service machines Repairs Maintenance Safety procedures (2) Services Settings Purpose of cutting Knowledge of field Engine types Mower types Electricity Paint mixing Cultural machines Spray machines **PESTS, WEEDS AND DISEASE MANAGEMENT** How to identify diseases Fungi identification Disease identification methods Insects identification Insect behaviour Fungi, bacteria, and virus diseases Creativity in prevention and treatment Safety procedures and controls Chemical control Biological control Knowledge of pesticides Advantages Disadvantages Danger Ground contamination Knowledge of nozzles Applications	Calibration check up Balance of nature Products Integrated management Use of fertilisers Irrigation **SOIL SCIENCE** Soil types (3) pH levels Structure/texture Soil improvements Aeration Characteristics of soils Manipulation Modification of drainage properties Cost effective/efficient practices Learning from overzealous management Analyse readings pH adjusting/reliability Taking samples